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AVIATION

The Oldest American Aeronautical Magazine

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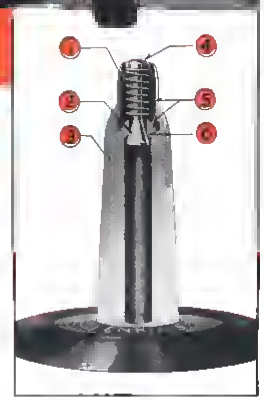

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THE
OLDEST AMERICAN
AERONAUTICAL MAGAZINE

AVIATION

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Contents for Vol. 36, No. 9

SEPTEMBER 1937

Flashes

From the Skyways of the World

» WE'VE BEEN TELLING YOU right along that this industry is growing. In evidence we offer the following statistic: last year United Aircraft's annual picnic at Hartford was attended by 11,000 people (employees and families). This year the figure was close to 17,000.

» ALMOST IN THE "BELIEVE IT OR NOT" CATEGORY is the story of the gal who takes four airplane rides a day but never leaves the ground. Grace Rocheforte, American Airlines' telephone operator at East Boston Airport, finds that she saves time coming and going to work, and when going out for lunch, to catch rides in the Airliners as they are taxied between the terminal building (near the field gate) and the service hangar (where her switchboard is located). Fortunately, certain of the plane movements for the frequent New York-Boston schedules correspond exactly with her own "taxi" schedules. She rides about 500 miles a year in airplanes without leaving the ground!

» FITTING ENOUGH, bronze busts of Orville and Wilbur Wright were recently placed in the Army Aeronautical Museum at Wright Field, Dayton. They are the work of Sculptor Seth Velsey. He made the Wilbur Wright likeness from photographs supplied by Orville Wright. The latter sat for his own portrait. The bronzes were cast by Professor Mazzolini of Antioch College, an outstanding authority on such work.

» SEVERAL INQUIRIES HAVE BEEN RECEIVED about the frontispiece of the August issue. Unfortunately we haven't any pictures like it to send out, for it was a composite photograph made up from a couple of pictures obtained from Fred Loomis, official photographer of Elmira's soaring meets. Incidentally, one of our good friends remarked on seeing the issue that he "couldn't see the editorials for the trees", but that has been the only kick and we are inclined to think that our art department did us a pretty swell job on it.

In This Issue

The National Air Races are with us again, so we have collected all available pre-race dope on programs, prizes, pilots and planes. Readers who remember last year's race issue will have no trouble in identifying Secret Agent 1313-X as our genial West Coast editor C. F. McReynolds. . . . A companion piece to the race story is Tex Rankin's explanation of how he prepares for his stunting programs. . . . A sometimes troublesome problem is covered by Mr. Lee Parker's Handbook for Bouncers on page 32. Mr. Parker is a Cincinnati lawyer who has made a special study of aviation litigation. . . . How one successful fixed base operator makes outdoor advertising pay. . . . Don Fink of *Electronics*, one of our radio advisers describes the Bendix radio equipment he saw on board Mr. Archbold's flying boat "Guba". . . . Commander Weems continues his navigation series with a lesson in dead reckoning. . . . Details of the two ships for this year's North Atlantic experiments by Germany's airline Lufthansa. . . . The latest in new flying equipment, including Ryan's new cabin job, and further details of the new Bell fighter.

» TWO "LANDMARKS" not dear to the hearts of pilots operating off Boeing Field (Seattle) have recently disappeared from the skyline. Towering 200 ft into the air on the north field boundary two smokestacks have long since constituted a menace to airport traffic. They served an industrial plant requiring forced draft for its high output steam boilers, but a plan was finally devised by which the stacks were lowered to 40 ft. and furnace draft maintained by means of power blowers.

» MARKING THE TENTH ANNIVERSARY of the first civilian flight to Hawaii from the mainland, Lieut. and Mrs. Emory Bronte flew from San Francisco to Honolulu on the China Clipper on July 14 and 15, exactly ten years to the day after he and Ernie Smith, now a TWA dispatcher at Burbank, Calif., had made the first flight. On that occasion Bronte was the navigator and Smith the pilot. Following their flight to Honolulu the Bronte's returned to the mainland by steamer and visited with Smith at

Los Angeles. Bronte is now a sales executive with the Associated Oil Company, in San Francisco.

» COMING INTO HAGERSTOWN well after 9 o'clock one evening recently we found factory lights blazing at Fairchild's. In the plant a night shift was rushing work on an amphibian for export. Looking through the works with Assistant Production Manager Revelle we found much interesting machine tool equipment for labor saving shortcuts and a number of ingenious production methods. Later, in talking with Henry Reisner, we learned a lot about production control and we are going to ask Henry to write something about it for us. Then we went up to see how Sales Manager Galligan ran the merchandising end of the business. While we were there he took time out to deliver a ship to a couple of distributors from Detroit.

We found another night shift working at the Jacobs engine plant with Henry M. McFadgen, and had a brief talk with J. Story Smith. Jacobs has plenty of orders and is doing a good job of keeping abreast of them.

On the way down we stopped off at Reading, Pa. to see how the new airport is coming along. Reading has gone about its airport development in the right way, thanks to Insurance Broker Melvin Nuss of the Chamber of Commerce, who has taken plenty of time out of his own business to see to things.

» ANNOUNCEMENT HAS BEEN RECEIVED from Manila of the marriage of Mrs. Lydia Van Hagen to J. Parker Van Zandt, Pan American Airways' representative in the Philippines. Mr. Van Zandt is an aviation man of many years standing, holding D of C pilot's license No. 17. His many friends in the industry join us in extending congratulations.

» MR. HARRISON BULLOCK of Albany recently took his mother on a round trip from Albany to the West Coast in his Ranger-powered Fairchild '24. They made the trip in easy stages taking time off to visit friends and places of interest along the route. They visited about 30 cities and covered 6,692 miles but the trip consumed only nineteen days. The total transportation cost (including gas, oil and stringe) was only $187.47 or about 1.4 cents a mile per person. Not bad, what?

» WE MADE a very serious slip last month in reporting a release on the new XLM-1 multiplace fighter for the Air Corps by Bell Aircraft Corporation of Buffalo. Larry Bell and Ray Whitman promptly and properly called it to our attention in no uncertain terms. So,—you can get the latest—and the correct—dope on this remarkable new machine on page 49.

» AND WHILE WE ARE AT IT,—in the table that appeared on page 45 of the August issue it was stated that the DC-4 is powered with 4 Wright Cyclones. Actually the machine is engineered for alternate Cyclone equipment, but the specifications for the first machine now nearing completion at Santa Monica call for 4 Pratt and Whitney Twin Hornets each developing 1,400 hp. for take off on 95 octane fuel with a normal rating of 1,150 hp. at 2350 r.p.m.

» WE ARE DELIGHTED to announce the return to AVIATION'S staff of Dan Sayre, signed on as Associate Editor. In the two years that Dan has been away from us he has covered a lot of new ground both with Pan American Public Relations and with News-Week, where he has been knocking out the aviation column.

» CHARLES G. CLEVELAND has resigned as our news editor, to handle P.A.A. publicity at the Port Washington Base. Already he's having lots of fun checking celebrities in and out on the Bermuda runs and looks forward to some trans-Atlantic customers 'a little later.'

Side Slips

By ROBERT OSBORN

» JUDGING BY AN ITEM in the New York *Herald Tribune*, one of the air lines must be running pillow fights to provide amusement for passengers on its sleeper planes — The company

has flown 3 622,124 passenger-miles and carried nearly two hundred tons of air cushions "

(Thanks to Bob Ball of The Detroit News for proof-reading his friend Carl Allen)

» THE ADVANCE NEWS on the National Air Races tells us once again that all of the entries are super-ships As this makes the seventeenth National Air Races in which all of the racers are "super" ships we think there is a crying need for some new superlatives in aviation publicity We might suggest something on the order of the classifications used by the packers of fruit which, as we remember it goes something like this —'Large Grant Mammoth, Colossal and Super-Colossal" there being no small or medium sized fruit produced by this country Or, we might borrow an idea from the movie industry and start grading our airplanes as one star, two-, three- and four star ships As time goes on we would undoubtedly be producing 117 star ships and so on up to figures comparable to the national debt

» OUR PERSONAL NOMINATION to the group of scientists having great personal courage as well as the courage of their convictions Professor Jean Piccard

» BEING AN ASPIRING ECONOMIC ROYALIST we don't approve of many of the principles of Communism but we are very much in favor of the wearing of caps and the non-wearing of neckties as affected by the Russian pilots and their superiors in Moscow Even our best friends tell us that we look terrible wearing a cap, but so does everybody else, and we wish that an American sartorial dictator would issue a decree for caps and no neckties so we wouldn't be so conspicuous

We're not alone in this wish either We know of one very prominent aviation executive who wore a disreputable gray cap on all business trips as well as socially, until the Board of Directors passed a resolution against it

» IN A RECENT ISSUE the *Saturday Evening Post* printed a note of concern on aeronautical matters

'The country is being built up so rapidly that there is reason to fear that very soon there will be no more large flat tracts of land inaccessible enough to be transformed into city airports.'

We are very glad to be able to reassure the *Post* that a solution to this problem has already been worked out being merely an extension of the present system of having the New York City air terminal outside of Newark, N J, and the Philadelphia passenger station on the opposite side of Camden N J As the cities grow larger in the future, in order to maintain the time-honored aeronautical custom of inconvenient airports, it will be a simple matter to land Philadelphia passengers at Newark, and New York passengers at Camden.

» THIS REMINDS US of one pilot's description of the quickest way to get

to New York's municipal airport at Barren Island — Take a taxi to the bus terminal transfer to a bus for Newark airport and when you get there hire a pilot to crank up his ship and fly you over !

» A COUPLE OF PILOTS were recently flying low above the tracks in back of a speeding train to give the passengers a thrill When the train suddenly slowed down they had to swerve the plane hitting some high-tension wires and dropping into a river from which they were rescued by a group of swimmers

Of course this is just another example of the carelessness and "Public be damned" policies of the railroads We wrote our congressman about it

Race Progress

SECOND ONLY to man's primal instincts for self preservation and propagation come the urge to compete and the desire to show off. They crop up in every department of human activity. So aviation being no exception, the time is again at hand for it to "strut its hour upon the stage" in the National Air Races of 1937.

With a completely new airport layout at Cleveland, and with more prize money offered than ever before, this year's races should set new standards. Elsewhere in this issue we have assembled all the available material on the program, the prizes, the planes and the people that promise to make a visit to the 1937 races well worth while.

We've never been particularly impressed, however, by the claim that air racing, national or otherwise, makes great scientific contribution toward the advancement of the art of flying. Talk of "improving the breed" and "the great laboratory of the industry," and glib comparisons with the Kentucky Derby and the Indianapolis Classic seem to us to be the most specious form of twaddle. We are prepared to admit the argument that racing has developed a highly specialized form of horse flesh for the Derby, and we will concede some gains *in the past* for automobile, and even for air racing (say about the time when the picture on these pages was made), but if you would take all the prize money offered at Cleveland this year (and it is an all-time high) and multiply it by a hundred, you would still fall short of the total amount that the industry is spending every year for research and development for non-racing purposes. If racing were to be

abandoned entirely it would affect the overall amounts available for research not one jot nor tittle What with air transport just getting into its stride, and the world teetering on the brink of a miscellaneous assortment of military exercises of a more or less serious nature there are plenty of more practical inducements to progress Nowadays race plane builders are following far behind military and commercial designers rather than leading toward faster and more efficient craft

But this year the air show at Cleveland promises to be "bigger and better" and *as a show* should be sufficiently worth while in itself so that it needs no "laboratory" argument to justify it The public is distinctly interested in aviation and aviation definitely has something to show the public

Let's not spoil things however, by a lot of phoney hoop-la, with groans and bellows and frenzied exhortations to "Puh-leeze pull her out Jack!" to whip up hysterical excitement and a lust for blood in the stands Closed course racing and good aerobatics are thrilling enough without artificial stimulation Give the crowds acrobatics, parachute jumps, mass military maneuvers, and closed course racing, but at the same time develop the broader implications of these things in modern air transport and in national defence We are inclined to think that the British do a little better than ourselves in their yearly military and civil displays at Hendon But after all, the American temperament is different from the British and perhaps we can achieve the same result with our annual races

We feel that there is opportunity here to present a colorful but rational pageant of aviation progress to half-a-million people and we go to Cleveland this year with high hopes that our expectations will be justified

Black is White?

According to a currently popular song,—"Black is White and White is Black" for no assignable reason except that somebody's 'Baby says it's so"

That this was the White House theme-song-of-the-month seems obvious, with Hugo Black emerging as the White Haired Boy in the race for the empty seat on the Supreme Court Bench

But regardless of whose Sweetie says it's so, Black will never be White in the eyes of this aviation industry His record on aviation affairs is certainly not one to inspire confidence Few of us who lived through the Black days of early 1934 will ever be able to forget the part he played, and we can find nothing in his subsequent history that would indicate that he has overlooked any opportunities to chuck monkey wrenches into the wheels of aviation progress He long since discovered that aviation is a "natural" as a source of headline publicity and he has made the most of it

Fortunately, however, as a member of the Supreme Court, Mr. Black will probably be in a position to do less direct damage to aviation than he could as a member of Congress We hope so. But we are more concerned with the broader implications of the appointment It leaves us with a rather uncomfortable feeling that one of the easiest ways of making political hay under the benign rays of the New Deal sun is to take cracks at aviation. We hope we are wrong. But, on the other hand, look at the Black Record.

At Long Last—

What politicians publications, and public opinion have so long failed to do seems to be on the verge of accomplishment by pilot pressure. The airport situation in the city of Washington, long the cause of acute jitters to operators and to passengers, and of undisguised astonishment to foreign visitors (who naturally expect to see the best airport in the United States at our own capitol) has at last been broken wide open by the airline pilots who are facing continued use of the field with newer, larger, and faster aircraft It is too dangerous, they say, for landings in bad weather—too small for take off with big machines with heavy loads The Air Line Pilots' Association has shown that unless some action is taken toward providing and developing a new site, pilots will refuse to land on or to leave Washington-Hoover Field A new type of "anti-sit-down" strike perhaps, but one that definitely shows promise of constructive results

Criminal Negligence

Over two years ago (December, 1935) in an editorial titled "Watch those Wires!" we urged every airport operator to campaign for the entire removal of overhead power lines in the vicinity of his field Such hazards are bad enough when they are long-standing and have been carefully noted on all charts, firmly fixed in the minds of all pilots using the airport But when they spring up over night, unannounced and unexpected, they become lethal instruments of the first order,—as was tragically proven at Daytona Beach

As we write investigating boards are still investigating, testimony is still being taken, but plain it is that Pilot Dietz knew nothing of the existence of new wires when he pulled the slup off the ground and headed for Miami Whether the power company forgot to tell the field or whether the field forgot to tell the pilot is not yet clear, but whoever slipped is as guilty as though he had deliberately run down the four victims on the highway This shocking accident again brings home the lesson that everywhere every time, we must "watch those wires!"

Camera's Eye on the News

1. A squadron of Curtiss Hawks, ready for action lines up for Gen. Chiang Kai Shek at the Shanghai airport. (Underwood & Underwood)

2. The R.A.F. shows off its first squadron of Vickers Wellesley long range bombers. Wings are of geodetic construction.

3. The crew of Russia's record breaking transpolar plane call on the Chief of the Air Corps. Left to right: General Oscar Westover; Michael Gromov, pilot; Vladmir Bequnov, Military Attache of the Soviet Embassy; Andrei Yumashev, co-pilot; Sergei Danilin, navigator (Underwood & Underwood)

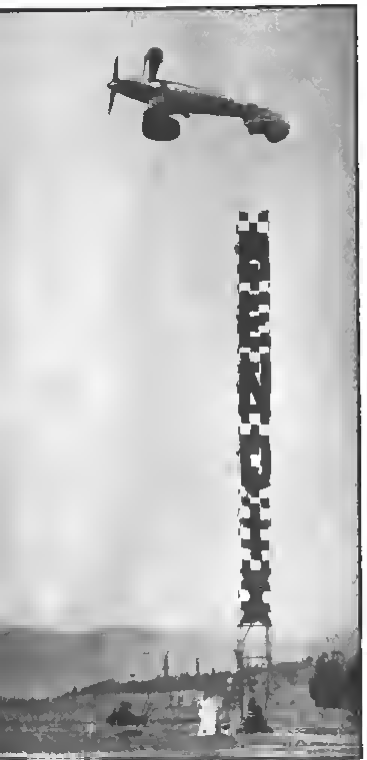
4. Juan Trippe, left, president of the Pan American Airways receives the collier Trophy from President Roosevelt, as Thomas Beck of Collier's Magazine looks on (Harris & Ewing)

5. Dr. Jean Piccard takes off under a flock of Dewey and Almy Kaysam balloons on a six-hour test hop for a flight to the stratosphere with 2 000 such. (Underwood & Underwood)

6. The Air Corps last month mussed nine of its big Boeing bombers at March Field, Cal. for maneuvers. (Wide World)

1937 NATIONAL AIR RACES

Program



FRIDAY SEPTEMBER 3

Official Inaugural Ceremonies 1:00 P. M. . . . Arrival Bendix Transcontinental Speed Dash Winners . . . Greater Cleveland Day . . . American Youth Day . . . Junior Aviator Day . . . International Day . . . Aeronautical Organizations Day

	Event Number and Description	Max. Cu. In. Displ.	Prize Money
1.	Bendix Trophy Race (Transcontinental Free-for-all)	Unlimited	$25,000
2.	307 Cu. In. Qualifying Race—Group 1 (Free-for-all)	307	1,500
2.	307 Cu. In. Qualifying Race—Group 2 (Free-for-all)	307	1,500
	Arrivo C. G. Taylor Trophy Race	40 hp	1,000
10.	Women's A. T. C. Handicap (Maximum 6 entries—Qualifying Speed 100 miles)	300	1,000
20.	Parachute Jumping Contest		200
24.	Group Parachute Jump (Each Jumper Will Receive $17.50)		

SATURDAY SEPTEMBER 4

All Ohio Day . . . Marine Day . . . National Aeronautic Association Day . . . Women's Day

4.	Louis W. Greve Qualifying Race—Group 1 (Free-for-all)	549	2,000
5.	Louis W. Greve Qualifying Race—Group 2 (Free-for-all)	549	2,000
6.	307 Cu. In. Feature Race (Free-for-all)	307	7,000
21.	Parachute Jumping Contest		200
25.	Group Parachute Jump (Each Jumper Will Receive $17.50)		

SUNDAY SEPTEMBER 5

Pennsylvania Day . . . New York Day . . . Michigan Day . . . Navy Day . . .

7.	Thompson Qualifying Race—Group 1 (Free-for-all)	Unlimited	2,000
8.	Thompson Qualifying Race—Group 2 (Free-for-all)	Unlimited	2,000
9.	Louis W. Greve Trophy Race (Free-for-all)	549	11,000
22.	Parachute Jumping Contest		200
26.	Group Parachute Jump (Each Jumper Will Receive 17.50)		

MONDAY SEPTEMBER 6

Labor Day . . . Akron Day . . . Army Day . . . Labor Organizations Day . . . Women's ATC Handicap Race

11.	Consolation Race (Free-for-all)	Unlimited	2,000
12.	Charles E. Thompson Trophy Race (Free-for-all)	Unlimited	24,000
23.	Parachute Jumping Contest		200
27.	Group Parachute Jump (Each Jumper Will Receive $17.50)		

A DAY AT THE RACES

Opening Ceremonies 1:00 P. M. . . . Parachute Jumping Exhibition . . . 1937 Aviation on Parade . . . Demonstration of Crazy Flying . . . America's Crack Pilots in High-Speed Closed Course Races . . . European Championship Acrobatic Flyers . . . Army Pursuit Squadron in Thrilling Combat Maneuvers . . . American Acrobatic Aces in Daring Exhibitions . . . Naval Fighting Squadron in Colorful Tactical Maneuvers . . . Human Bat in Death-Defying 10,000 foot Glide through the Air . . . Marine Corps Dive Bombing Squadron Demonstrating War-Time Maneuvers . . . Skywriting with Smoke . . . Tri-motored Ford in Thrilling Acrobatic . . . Hollywood's Movie Stunt Flyers in Nerve-gripping Action . . . Thrilling 12,000 foot Inverted Power Dive . . . and other innovations to be announced later.

ARMY, NAVY AND MARINE CORPS NOTES

For the first time the three service groups are appearing together at Cleveland. The Navy sends from Norfolk a detachment from the U. S. S. Yorktown of eighteen Grumman Fighters, and the Marine Corps a twelve plane dive bomb squadron. The latter will actually bomb the field in a spectacular maneuver. The Navy and Marine Corps are under the general command of Lieutenant Commander T. S. Combs, United States Navy. Commander Scouting Squadron 6. The Navy Corps detachment are under direct command of Lieutenant Commander W. S. Cunningham, and the Marine Corps detachment under Captain Christian F. Schilt.

The Army sends from Selfridge Field a group of eighteen planes of the latest fighting type and from Maxwell Field, Alabama, a special trio who give special exhibitions of stunt and acrobatic flying. Also one of the four motored Boeing Bombers will come from Wright field to be shown to the general public for the first time.

Sept. 3, 4, 5, 6 Cleveland

AVIATION'S RACING FORM

Secret Agent 1313-X has gone snooping again with camera and note book for a line up on this year's race prospects

IN 1851 THE AMERICA WENT TO ENGLAND and trimmed the sails of Britain's best boats. The English have been trying ever since to beat the Americans at yacht racing, but without success. In 1936 Detroyat put reverse English (or perhaps "reverse French") on the procedure, came to California and beat all of America's best racers to take away our Greve Trophy and Thompson Trophy. Now 1937 is to tell whether we are going to win them back, or just go on trying, like the English yachtsmen.

Detroyat's Renault Caudron which shellacked us in 1936 is a true example of the flower of European race planes—nurtured in the hothouse of a highly concentrated industry. But the flowers of American racers are, for the most part, nurtured in mad houses, outhouses, and back yards. If our American racers can defeat Detroyat in the Thompson Trophy this year it will be one of history's greatest triumphs of rugged individualism over 'government planning."

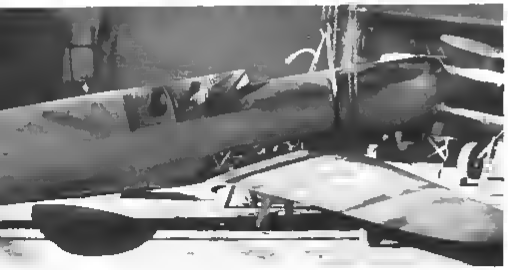
No matter what the International Aspect of the 1937 meet may be it will obviously surpass anything in air race history in the way of color, speed, and all-around class. Record entry lists are in prospect for every race. Added prize money and awakening interest in the sport of speed flying has brought a whole host of big names into the Bendix, Thompson and Greve Trophy Races. And the Cleveland show will not lack for the spectacular aside from the races themselves, from the program to be offered by Tex Rankin, international aerobatics champion. (See also page 29) through the military maneuvers to the unique demonstration to be staged by Studebaker with three of the new Waterman Arrobiles, tailless planes with detachable wings.

In the Bendix Race practically everyone has entered except Howard Hughes. Foreign Bendix competition may bob up in the form of Capt. Alex Papana, who plans to enter his unusual new Bellanca tri-motor racer which mounts two Menasco Super Buccaneer engines in the wing nacelles, and a Fairchild Ranger V-12 in the nose. Or Detroyat may try the Bendix although official word is lacking. Latest available information at time of going to press was that Bendix contestants would include three Beechcrafts, two Seversky's, two Lockheeds, a Northrop, Papana's Bellanca, Roscoe Turner's two racers, and H. C. Marcoux's special racer flown by Earl Ortman. Harry Crosby, rushing a new Menasco powered racer to completion for the Greve and Thompson races, may have to fly in the Bendix race to get to Cleveland in time for the other events. His plane will carry enough fuel to make the trip with two stops. Most of the others, including the Marcoux entry, can fly the Bendix non-stop. Pilots will probably include Roscoe Turner, Louise Thaden, Jacqueline Cochrane, Laura Ingalls, Frank Fuller, Capt. Alex Papana, Earl Ortman, Milo Burcham, Paul Mantz, and possibly Merrill and Lambie and Harry Crosby.

An interesting entry is Fuller, who will fly a special Seversky. Wealthy paint manufacturer and sportsman pilot, he was sponsor of the original Keith Ryder racers that made race history from 1930 through 1936.

As in 1936 when the women took both first and second places in the Bendix, the chances are reasonably good for a feminine victory again this year. Probably not as strong as last

Racer built by Lawrence Brown for Roscoe Turner last year. Reported extensively revamped for 1937. (P. & W. Twin-Wasp)



The Haines H-3 racer. Note windshield treatment. (Menasco B6S)

year however, and we'll guess that a mule will unchivalrously poke his nose across the line in front. The competition is so hot that Howard Hughes' transcontinental record will certainly get its first healthy scare, with odds all out even for a new record.

Larry Therkelsen will be in charge of West Coast arrangements for getting the Bendix off on schedule.

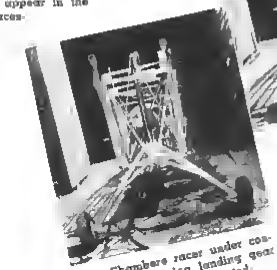
Thompson dope

The Thompson Trophy this year should look about like last, only faster. On pre-race form the two first places would again go to Detroyat and Ortman, except that Turner may slip in between them with his new racer and any of these three may win. The ship flown by Don Rae last year, now the Schoenfeldt Racer flown by Gus Gotch should again take third or no worse than fourth, and may spring an upset. Harry Crosby will be back with a new Crosby Racer and should again place. Rudy Kling has a very fast new Folkerts and is an even bet to be among the leaders. And Marion McKeen flying the veteran Brown B2 Miss Los Angeles has a ship which has placed in the money in three successive Thompson Trophy races so must be conceded a good chance to repeat.

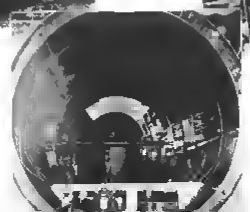
The Caudron racer used by Detroyat in 1936 (Renault)

The original Delgado Maid. A new version will appear in the 1937 races.

Air scoop for oil cooler under tail of fuselage on Marcoux racer



The Chambers racer under construction, showing landing gear raised and retracted.



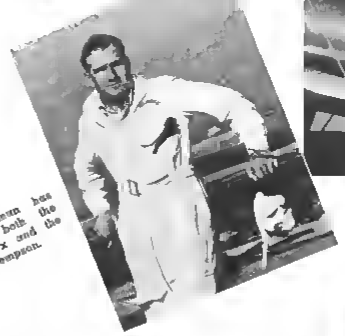
Fuselage cross-section of Earl Ortman's Marcoux racer. (P. & W. Twin Wasp)

Frank J. Haines. His racer is shown on opposite page.

Sportsman pilot Fuller beside the special Seversky which has been groomed for the Bendix race. (P. & W. Twin Wasp S2C3)

Marion McKeen will fly the 1937 version of Miss Los Angeles.

Roscoe Turner with his famous '57'. (P. & W.)



Earl Ortman has entered both the Bendix and the Thompson.

Detroyat and his plane must remain a mystery until race time but we can only hope he is on hand as, with some very intensive work by several American entrants during the past year there is every chance that our boys can now really give Michael a race to write home about. We will not be surprised to see two or three foreign entries this year although Capt. Papana will probably confine his racing

Crosby's 1937 racer was built in the Curtiss-Wright Technical Institute shops.

Above left. William Schoenfeldt with the original Keith Ryder which he has rebuilt extensively for 1937. (Menasco)

Above right. Harold Neumann with the 1936 Folkerts special.

to the Bendix, the Bellanca being primarily a long range plane

Turner's hopes will be pinned on two planes being conditioned by Mattie Laird, according to last reports One is his veteran Wedell-Williams which is still a very fast airplane, and the other a dark horse, originally built by Lawrence W Brown on the West Coast, never test flown and since reported shipped East for Mattie Laird to fashion a new wing and landing gear The plane was originally a twin-Wasp job with cantilever midwing and fixed landing gear Designed for speeds in excess of 350 m p h the Turner racer may prove the sensation of the year in its new form

Even better prospects for success in the Thompson must be conceded to Earl Ortman flying the H C Marcoux racer rebuilt by F J Roberts to the design of Jock Bromberg This plane was in the 300 m p h class last year with a single row Wasp engine This year it has been completely revamped, fitted with a twin-row Wasp Jr S2A5G Pratt & Whitney engine of 1250 h p , and a Hamilton-Standard constant speed propeller The engine mount has been designed as a unit and may be completely removed from the plane in 15 minutes for between-race servicing For Bendix range this ship has a new 250 gal. fuel tank, sufficient for a non-stop transcontinental flight The Marcoux racer is a conventional cantilever low wing monoplane with retractable landing gear, and split flaps Span is 25 ft. 6 in , length 23 ft. 3 in and wing area 106 sq ft A new wrinkle is the placing of the oil tank and oil cooler in the lower rear part of the fuselage with a tunnel type duct for cooling air to the radiator This reduces drag to a minimum for the ordinary type radiator

Fuller's chances

If Frank Fuller flies his Seversky in the Thompson as well as the Bendix it will provide an interesting comparison of this well known military pursuit type in closed course competition with planes of strictly racing design However, Fuller is not a race pilot although a sportsman flyer of long and wide experience, and there is some doubt if he will enter the Thompson, or if he can successfully match his plane against the field in the event that he does enter

Barring another Seversky, some unknown foreign competition, or other dusky steeds to be resurrected from among the current crop of rumors, the balance of Thompson Trophy finalists will be picked from among the Greve Trophy racers, with possibly one or two little 397 class ships sneaking in as was the case in 1936 Two of the most promising Greve and Thompson racers are the entries of Wm Schoenfeldt and Rudy Kling Schoenfeldt's racer was the Menasco B6S powered Ryder flown by Don Rae in 1936, but it has now been completely rebuilt by Schoenfeldt and his helper Rodney Nimmo, with assistance of Jess Hall, veteran assistant to Ben O Howard on Mike, Ike, and Mister Mulligan Schoenfeldt has put a new Super Buccaneer Menasco in his racer had a new propeller built for it and has completely re-cowled and re-finished the plane throughout At St Louis this year it looked fast, taking one first place and one second in spite of propeller trouble At Cleveland the Schoenfeldt will be flown by Gus Gotch Top speed for this year is estimated at 300 m.p.h The plane is a low wing cantilever monoplane with a wood wing Span is 18 ft length 19 ft 6 in , wing area 60 sq ft and gross weight 1550 lbs Kling's semi high wing Folkerts Special with new Menasco Super Buccaneer engine is considered potentially as fast as anything in the Greve race except Detroyat. This plane is a duplicate in size and design with Harold Neumann's Folkeris which did so well last year at Los Angeles—except that Kling has the larger Menasco engine.

This year's Crosby Racer should make a better showing than the Crosby Special of 1936 That plane was ridden to a forced landing by Harry Crosby, putting him in the hospital for almost six months with crushed vertebrae and numerous other injuries, but he has made a remarkable comeback physically and has produced a new and better plane At this writing his plane is still under construction in the shops of the Curtiss-Wright Technical Institute under the supervision of Burchard Wilson, instructor in charge of experimental work Powered with the very latest Menasco Super Buccaneer engine, equipped with a new propeller, and fitting a fully retractable landing gear the Crosby plane gives promise of this year living up to the expectations which were held for it at the Los Angeles races Only all-metal race plane in existence so far as we know, the Crosby has a stubby wing of sharp taper Span is 16 ft , area 64 sq ft. The wing is 2½ in deeper at the center than last year in order to accommodate the retracted landing gear, and the fuselage is 3½ in deeper to better accommodate the pilot. Fuel tanks to carry 74 gals have been installed, and a new feature is the skin type oil radiator similar to that introduced by Schoenfeldt at St Louis On Crosby's ship the oil radiator is built in three sections, of stainless steel shot welded Oil flows through these sections in series which should provide more than ample cooling The tail skid also retracts with the landing gear, which is electrically operated Flaps are spring loaded, extending automatically, although there is a positive device for pulling them up

Another Greve racer to carry one of the new Super Buccaneer Menascos is the Delgado Maid II from the Delgado Trade Schools, New Orleans, but this plane is a dark horse at this writing and we can only suppose it

(*Turn to page 79*)

Tex Rankin

1937 St. Louis International Aerobatic Champion tells how he builds up his routine of

PRECISION AEROBATICS

to Charles F. McReynolds

AVIATION'S West Coast Editor

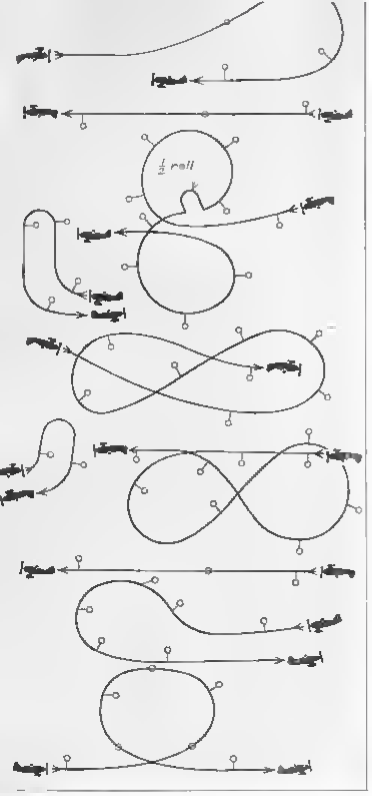
A DRUNKEN COWBOY on the recent Oregon Air Tour suggested a new maneuver that I'll be performing at the National Air Races this year For want of a name I call it the "Oregon Sea Serpent," or the "Lary Lalapaloosa" after Al Lary, well known Los Angeles pilot, who suggested it. For Al Lary was the "drunken cowboy" and it was all part of his act on the Oregon Tour, where he staged some of the prettiest "crazy flying" I've ever seen. The "Oregon Sea Serpent" is a series of hammerhead stalls with reversements at the top to give alternate upright and inverted zooms It's a great favorite with the crowds, but is in a different class from the precision aerobatics one is up against in really big time aerobatic competition There precision is all-important It is not one of those things where you can give Three Whoops and a Holler,—all but yank the wings off your plane,—and hope to come out on top

Competitive precision aerobatics is as scientific a proposition as radio navigation of the latest transport planes And the pilot who seriously studies precision aerobatics will be a safer pilot, in the long run for it But he must do his learning in a modern plane, with a qualified instructor, at a safe altitude and sitting on a 'chute Once having mastered the fundamentals of precision aerobatics he'll never be upset by the unexpected little occurrences that sometimes produce stalls or spins for pilots who are in poor position to recover from them I have twenty years of experience and more than 7,000 hours of flying behind me,—and my wife and four kids at home give me plenty of reason to stop, look, and listen in connection with my aerobatic flying

A Word of Warning

Such work is not to be tackled lightly and the novice should be warned right here that recklessness and a dare-devil mental attitude have no place as, indeed, they have no proper place in any form of flying

For every thirty minutes of exhibition flying I put in at least ten hours of hard monotonous practise that the crowd never sees Much of this is on simple maneuvers such as loops, spins, and rolls These simple maneuvers are to advanced aerobatics what the musical scales are to a talented pianist It is of primary importance for anyone interested in precision aerobatics that he should first perfect himself in these simple exercises. There are really only about five possible aerial maneuvers banks, rolls, loops, stalls, and spins All other maneuvers are combinations or variations This is why each pilot competing at St Louis was required by the judges to start his show with two compulsory maneuvers, a loop and slow roll, and these two simple exercises counted more heavily than any other single maneuver on



Description	Points
(Compulsory Loop and Slow Roll at Start) Slow half roll	1
Slow half roll to inverted	2
Vertical eight two outside loops	10
Stall turn (Hammerhead)	3
Lateral eight out of inverted position. (inverted outside—regular inside loop)	7
Inverted stall turn. (Inverted hammerhead)	4
Lateral eight out of inverted position. (inverted inside—regular outside loop)	8
Slow half roll to upright from inverted flight.	1
Slow turn (Wingover)	2
One slow roll in circle turn.	9

the program even the most intricate

My preparation for St Louis—passing over previous years of experience and practise—commenced at my home base on Union Air Terminal, Burbank, California. I first studied the official regulations, which listed 84 maneuvers and the maximum points allowed for each—ranging from one to ten. Several rules made the contest particularly difficult. All maneuvers were required to be completed in ten minutes, no credit being given for any flying done after the ten minute deadline, no credit was given for maneuvers not performed within the airport boundaries, and no credit was given for maneuvers performed twice. So it was essential to pick the maneuvers that paid off the highest on points and at the same time to plan the routine so that maneuvers tied into each other without lost motion every move counting points. Also, the time element had to be closely figured in order to perform maneuvers that would give the highest possible number of points per minute. Points were determined on the basis of a coefficient of difficulty and it was interesting and significant to find that some of the most spectacular maneuvers, always popular with crowds, were rated very low. Thus a snap roll counted only one point, a double snap roll only two points, and a spin only one point. The result was that none of the contestants performed the old crowd-appeal standby, the spin, which was not only rated low on points, but was only a time and altitude waster. And a number of other spectacular maneuvers to watch were passed up for more difficult and highly rated maneuvers which drew points from the judges and yawns from the stands.

Watch the wind

Even the direction and speed of the wind affects a carefully planned aerobatic routine and after arriving at St. Louis and studying the wind conditions I found it necessary to reorganize my plan in order to do certain maneuvers or groups of maneuvers with a tail wind, others against the wind and so be sure of staying within the airport boundaries at all times without cramping myself or losing time while maneuvering for position.

Back at Union Air Terminal my first practise program in preparation for the St. Louis competition combined twenty-five maneuvers within the required ten minutes. I determined the time exactly by carrying a stop watch and repeating the entire routine until I had established to the second just how long each move required. This first program, developed after considerable study, produced a theoretical total of 246 points. In trying to improve on this I worked out and practised a total of twenty different programs, diagramming and timing each one completely. The final set of maneuvers won for me with a total of 282.7 points which was just about 37 points more than the first set of maneuvers. So I went through twenty alternate programs to improve from 246 points per minute to 283 points per minute—hours of practice for a gain of less than four points per minute.

In connection with preparing such a program it is well to remember that each should be performed at an ideal speed for any given airplane. A maneuver cannot be well done if rushed beyond the normal rate, or if done too slowly. So it was not just a question of "tightening up" on the maneuvers and gradually cramming them closer together. To do precision flying properly the pilot must develop a high degree of "feel" of the plane and permit it to fly through the program, rather than to haul it around by brute strength. There has probably been no plane built that a good pilot could not break apart in the air by deliberate manhandling. On the other hand I reached speeds of 280 m.p.h. or higher in outside loops pulling up in the inverted position and through proper timing did not subject myself or plane to hazardous strains. Although the outside loop is considered very spectacular, and in some respects it does impose the most severe loads on the plane, it is interesting to note that the pilot suffers no ill effects from a violent outside loop, whereas he may "black out" completely in a fast inside loop. The pilot's own reactions to his maneuvers are not always correct indicators of the strains he is imposing on his plane. This fact should always be borne in mind by aerobatic pilots.

Description	Points
Wing-over	1
Half snap roll to inverted flight.	1
Figure eight out of inverted flight with one slow roll.	10
Inverted wing-over	3
Figure eight in inverted flight with six to eight slow rolls	10
Half snap roll to normal from inverted flight.	2
Split turn	1
Lateral eight—outside loop inverted climb inverted inside loop, normal climb.	8
Vertically banked turn.	1
Lateral eight—loop glide outside loop glide	7
Half loop out of inverted flight.	2

Equipment used

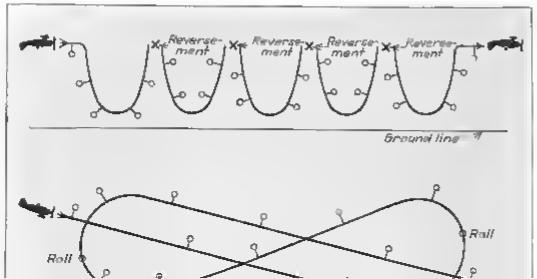
The plane I used at St. Louis and which I am using in all my aerobatic exhibitions, moving picture flying, and student work is a stock Ryan STA monoplane powered with a stock Menasco C-4 125 h.p. engine. Monoplanes have not ordinarily been used for aerobatics but I have found the ship ideal for such work and it is my impression that the last stronghold of the biplane type has now been successfully invaded. The only special equipment on the plane is a front cockpit cover, a Kollsman sensitive altimeter, and a small telephone number finder on the dashboard to carry a tape upon which I diagram my complete program, which I unroll by hand as the maneuvers are completed. The sensitive altimeter is essential in gauging position above the ground at which to start maneuvers for safe ground clearance. Another item essential to the aerobatic flyer is a shoulder belt. Mine was made by Guy Ball, and holds me solidly in the seat during all maneuvers yet has a quick release acting simultaneously on leg and shoulder straps.

My Menasco engine has no special provision for continuous operation in inverted flight. In fact the oil pressure drops to zero every time the ship is put into an inverted position. The engine manufacturer would probably not commend this practice but after 300 hours of aerobatic work, with power dives to 300 m.p.h. and engine r.p.m. to 3500, and with the plane

(*Turn to page 79*)

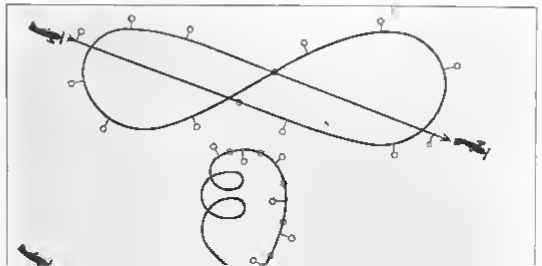
1 **OREGON SEA SERPENT**—or the **LARY LALAPALOOSA**—**A series of hammerhead stalls with reversement proceeding across the field to produce a series of upright and then inverted dips.**

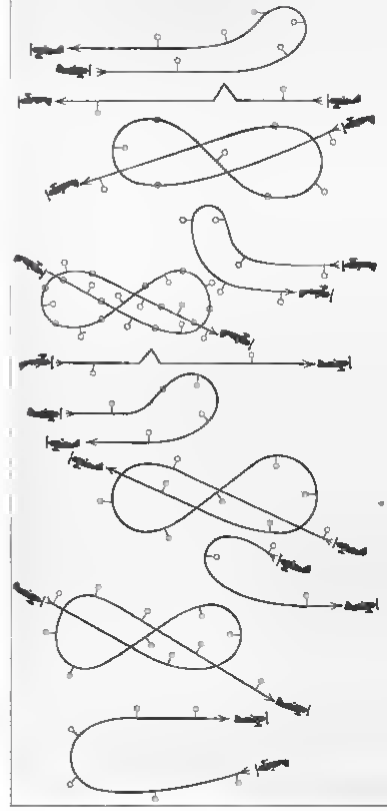
2 **RANKIN ROLLER COASTER.**—**Lateral figure eight with one-half slow roll at each end.**



3. **CUBAN EIGHT**—**Introduced by Capt. Lem Povey.**—**Lateral figure eight with one-half slow roll at intersections.**

4. **FRANK CLARK "REVERSEMENT ROLL"**—**Vertical roll, with fast right and left roll then two snap rolls at top and spin down from stall.**





To SOCK . . . or NOT to Sock

A Word of Caution to Would-be Bouncers on the Legal Rights of Drunk and Disorderly Persons at Airports

By Leo T. Parker

BECAUSE OPERATORS OF AIRLINES in some localities have had difficulty with unruly or disorderly patrons, it is important to know that the higher courts have laid down certain well settled rules which, if followed, will relieve operators from liability while dealing with undesirable patrons, either in stations, on the premises, or in planes.

The higher courts have consistently held that airline employes, such as plane operators, and station attendants have a legal right to eject a disorderly, drunken, or otherwise undesirable patron, particularly if he becomes a nuisance, and disturbs the quiet of other patrons. A review of leading cases discloses that the higher courts have laid down certain and well defined rules which, if adhered to, may be safely followed when ejecting undesirable patrons. However, if these established rules are not carefully followed heavy liability in damages may result.

For example, in a leading case (149 S. E. 331) a company was held liable for $3,500 damages where the evidence proved that an employe struck and seriously injured a patron who was stubborn and refused to leave the premises when he was requested to leave. In this case the employe did not use ordinary force to eject the patron, but he immediately struck the patron when he said that he would not leave. This court stated important law:

"If a man strikes another and inflicts a battery upon another, and can show a lawful excuse for it, he is *not* liable. Now, it is also a principle of law that words are *never* a sufficient or lawful excuse for a battery, *it does not matter how insulting* or approbrious the language may be, the law does *not* recognize that words are sufficient provocation to justify an assault . . . If, however, one conducts himself as to become offensive to the proprietor . . . the proprietor has the right to eject. Now how must he eject him? He must proceed, first, by ordering him to leave the premises, if he declines to go, and does not go, he must first use *gentle* means, and lay his hands upon him gently, if he resents and refuses to go, the proprietor . . . may use *whatever force is necessary* to eject the trespasser, *but he must not use more force than is necessary.*"

In still another case (154 S. E. 770) a company was held liable for $7,500 damages where the testimony indicated that a manager struck and seriously injured a patron. The patron proved that he had committed no act which justified being assaulted.

Handle With Care

The higher courts have held that any and all persons are deemed to know the exact consequence of their acts. Therefore, where an airline employe has just cause to eject a disorderly, drunken, or otherwise undesirable patron, he may exercise reasonable judgment and request the patron to leave after which the employe is justified in using *sufficient* force to eject the patron if he refuses to leave quietly. However, irrespective of the degree of force required to eject a patron or to start to eject him, the employe must remove his hands from him as soon as he is off the premises, or if the patron says that he will leave quietly. In other words, care and prudence must be exercised to avoid using more force than actually is necessary.

On the other hand, if an airline employe desists from using force when a disorderly patron is ejected, or being ejected, and the patron attacks the employe the patron is liable for damages to the extent of the injuries sustained by the employe. Furthermore, the airline employe and assistants may use great force to protect themselves against injury.

Rules Within Reason

A well settled point of the law is that an airline employe has a legal right to eject any patron who persists in violating reasonable rules and regulations. In one case a passenger violated a rule against persons protruding their feet into the aisle. The court held that under these circumstances the duty of the plane operator was to request the man to obey the rules and then, if he persists, he should be requested to leave, at the next station, after offering to return the balance unused fare, and if he refused to leave then the operator may use the necessary force to eject him without incurring liability.

Of course, a passenger, or other person in a station, or on port premises, is entitled to recover damages if he is unduly ejected, although he is disobeying reasonable rules and regulations. In other words, it is well established that a company is liable in damges where the evidence indicates that an unusual or unnecessary degree of force was used in ejecting a patron, or passenger. This rule of the law is particularly applicable if the patron proves that he was assaulted, injured, arrested, or otherwise humiliated by an authorized employe.

For illustration, in the recent case of Wineland v. Shaw, 14 P. (2d) 226 it was shown that a person was employed by a company and authorized to eject disorderly persons and arrest them.

One night the employe accused a patron of smoking against the rules. An argument followed during which the employe violently assaulted the patron, violently struck him over the left eye, cursed and abused him, and placed him under arrest.

The patron filed suit against the company for damages and proved that the employe did not peacefully request him to leave but immediately handled him roughly. The higher court rendered a verdict allowing the patron heavy damages.

"How much force can I use?"

New Use for Porters

It may be important for readers to know that an employer never is liable in damages for an act performed by an employe who acts outside the scope of his employment.

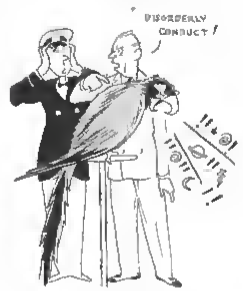
In one higher court case a company was held not liable for an injury to a patron effected by an employe whose duty it was to clean the floors, seats and dressing rooms. In this case the court explained that since the employe's sole authority was to clean the premises the company could not be held liable for the injury inflicted because this act was outside the scope of the employe's employment.

Obviously, any employe who is authorized to conduct or operate a department, or who is placed in a position where he is compelled to maintain order may lawfully bind his employer with respect to all acts, motives, contracts, and agreements within the scope of his authority. If, for example, an official authorizes a common employe, as a ground man, ticket seller, or other employe, to maintain order the company is responsible for injuries negligently inflicted by the specially authorized employe.

On the other hand, officials may avoid liability by giving explicit instructions to private policemen, and other employes, that under no circumstances may a patron be ejected from the premises without receiving expressed authority from a named person, as the manager. If a patron is disorderly, he may be approached and peacefully informed of such violations and requested to leave. When he refuses to do so the manager then may authorize the employes to eject him, using only such force as is necessary. If the patron violently resists, then great force and violence may be used in ejecting him without subjecting the company to liability.

What Is Disorderly Conduct?

Since the courts have held that employes of an airport or airline may, without liability, eject a disorderly patron, it is important to know the legal meaning of this term.



"Disorderly conduct is usually held to embrace all such acts and conduct as are of a nature to corrupt the public.

In Bennettsville v. Godbold 148 S. E. 710, a person was arrested and convicted by a lower court on a charge of disorderly conduct, upon proof that he had attempted to force himself into restricted parts of the premises. The

(*Turn to page 76*)

Believe in Signs

Outdoor advertising brings business to a fixed base operator

By Walter D. Burdette

"Let not the sign of your profession be eclipsed by them proclaiming the virtues of hot dogs, females, chili con carne or ice cold buttermilk."—Flying Service Decalogue AVIATION September, 1935.

"A MAN WITH A TOOTHACHE wants to know how many hours of flying instruction you will charge to extract it. He said something about throwing some signboard advertising into the deal. Shall I call the police or the insane asylum?"

Thus the blonde dental assistant addressed her employer.

"What is the collection percentage of bills due this month, Miss Zilch?"

"About twelve."

"I may as well get something for my services. Send the man in."

And so it came to pass that the dentist, the doctor, the grocer, the real estate broker, and innumerable sign painters flocked to the field to collect for goods or services and soon we were mixed up in more businesses than you could shake a stick at.

We had been going along pretty well before the depression and when the storm broke our assets were about 5,000 hours of flying time and a fair list of equipment. For a while we didn't have any money and neither did anyone else, at least for flight instruction. Since I have always enjoyed eating I turned to the only other profession I knew, the promotion of outdoor advertising. But I did not completely forsake my first love, for I found a way to combine the best features of flying and billboard advertising. We arranged to pay painters in flying time and paid for billboard space in flying time. Many of those from whom we bought signboard space with flying time, (in order to sell the space for a cash rental,) continued their flying on a cash basis after the initial flying time trade was used up. As we found it possible to make ends almost meet through running the outdoor advertising business the thought struck me that if billboard signs would sell other commodities, they should sell flying. Immediately I incorporated a new wrinkle in my combined flying and outdoor advertising business. We began to make deals for space on which to paint signs advertising the airport and soon we had quite a few signs of our own set up at practically no cost. Results were immediate. Prospects flocked to the airport. But they had, for the most part, no money to foot the bills for the flying they wanted to do.

Having pushed the plan that far we could not bear to give up without a further struggle and so, just as we had traded to get our signs up we began to trade flying time to prospects for whatever commodity they had to offer in return. We traded with service station operators for gas and oil to fly on, and for tires and batteries, we traded with grocers for the food we ate, with auto dealers for the cars we drove, with furniture men for office and home furnishings, with the doctor, the dentist, the baker and the butcher. Today the car I drive and the home in which I live are the result of such trading and I am practically in the real estate business through my dealing in property taken in trade for flying time. When business improved the trading feature of our operations diminished and, now that money is again in circulation, barter is seldom necessary, although I am still willing to talk business if it will produce a student or customer. As times improved somewhat we were able to increase the number of signs until there were a total of more than eighty scattered fairly evenly within a radius of approximately five miles from the airport. While others were still cutting down on their outdoor advertising we were increasing the number of signs and so they attracted even more attention than usual. Now that outdoor advertising has come back strong and sign space is again at a premium our signs have dropped to approximately forty, but those forty signs are still pulling in customers every day of the week.

The school now has more than one hundred students regularly enrolled and we operate a fleet of planes that includes a Fleet, Standard, Eaglet, Kinner Sportster, and Curtiss Robin. My own flying time has now mounted past nine thousand hours and I am devoting my time once more entirely to the flying business. However, I am still keeping closely in touch with the outdoor advertising business as an adjunct to my flying service.

Clapboard or corrugated metal surfaces hold no terrors for the Burdette sign-painters.

Visitors to the Los Angeles area cannot avoid the ubiquitous admonition to "Fly Burdette", which is plastered over the countryside with frequency exceeded only by "Mail Pouch Tobacco."

KHAHX = Guba

As we go to press, Guba is off to search for missing Russian flyers. Especially newsworthy, then, this description of her elaborate radio of the latest Bendix design.

By Donald G. Fink
Managing Editor ELECTRONICS

ON JUNE 24 the first coast-to-coast flight in a flying boat was made by Richard Archbold and his crew in the "Guba," a Consolidated PBY-1 flying boat powered with two 1000 hp Pratt and Whitney Twin Wasps. The newspapers in acknowledging this 'first', hardly mentioned that the flight was made with a purpose, the purpose being to allow Bendix engineers to install and test radio aids to navigation on the ship preparatory to the trans-pacific expedition to be undertaken by Mr. Archbold late in 1937 and the early part of 1938. As Research Associate of the American Museum of Natural History, Mr. Archbold will fly to New Guinea, in the Dutch East Indies, to collect and study mammals and birds. Partly because of the long Pacific hop involved, and partly because the ship must be in contact with field parties traveling on foot and with a base station, it was necessary to equip the plane with elaborate radio facilities. Currently, this radio equipment designed and constructed by the Bendix Corporation is under test at the North Beach Airport, New York.

The equipment layout

On board the "Guba" are five antennas (including two for direction finding), a main transmitter, an emergency transmitter, two receivers (both of which can serve for direction finding), d-f loop control facilities, and an interphone communicating system which connects the members of the crew to each other or to the radio. The power supply for this array is derived basically from the 12-volt supply of the ship, generated from any of three generators, one driven by each motor, the other by a hand-cranked gas auxiliary, for use when the ship is on the water. The 12-volt supply in turn drives individual dynamotors one for each transmitter and each receiver. Also provided is a low-frequency converter for driving the Autosyn direction indicator on the loop. The equipment is mounted in a compartment just behind the pilot's cabin, on the right side of the ship and is grouped around a small operating desk, from which position the radio operator can control all of the equipment, including the interphone without stretching his arm.

The antennas

Three of the antennas are for regular transmission and reception. The longest is a 500-foot trailing wire. For use on the water, a fixed V-shaped wire, about 140 feet long (half-wavelength for 3105 kc.), is available, stretched between wing-tip and tail. The emergency antenna, 50 feet long, runs above the fuselage from the main wing support to the tail. The direction finding loop is mounted just forward of the wing support and enters the radio room just aft of the forward wall. The loop is rotated by remote control. The remote control makes use of a hydraulic drive with an Autosyn electrical indicator which transmits the bearing of the loop to an indicator mounted directly above the operator's desk. The loop is thus mounted in the most advantageous position and its control made available at the desk. For obtaining the true direction indicated by the loop a sense antenna is used, a five foot vertical wire above the pilot's cabin. All of the antenna facilities (except those for direction finding) are brought into an antenna switching panel near the main transmitter, so that jack-and-plug connections can be made to any of the transmitters or receivers.

Transmitters and receivers

The main transmitter provides 100 watts output, for cw and 25 watts phone, the final output tubes are two RK 46's in parallel. The transmitter operates on any of four frequencies: 500 kc. crystal controlled, 3105 kc. crystal, 6210 kc. crystal, and 12420 kc. doubled from the 6210 kc. crystal. The first of these frequencies is the international distress and calling frequency, of great value in establishing communication with ships at sea. The remainder are standard aviation frequencies. Separate crystals are used on all bands except the 12420 kc. These crystals are mounted in vacuum in metal containers resembling the standard metal tube housing, and have very great stability under the extremes of temperature which may be encountered on the expedition. Switching from one frequency to another is performed simply by turning one knob on the front panel, which connects the proper crystal and tank coils, and inserts the antenna tuning coil, which is preset for each antenna.

The emergency transmitter which has two 837's in parallel in the final stage provides 30 watts output cw and 8 watts phone. It operates on two frequencies, 500 kc. and 6210 kc., each individually crystal-controlled. Switching from one frequency to the other is accomplished simply by flipping a toggle switch on the front panel.

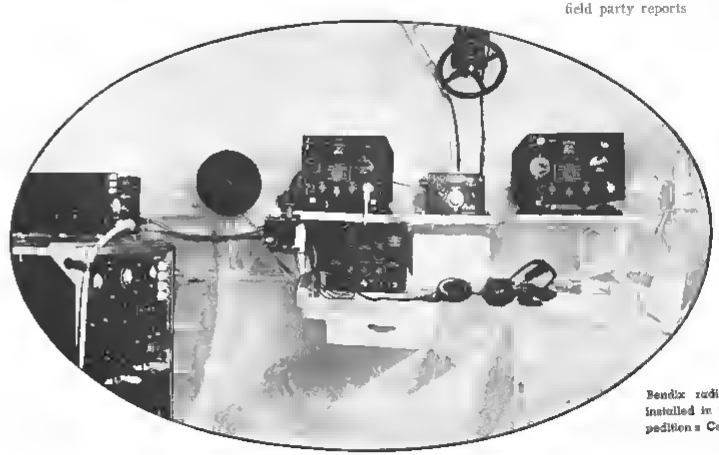
The two receivers are identical. Each covers a continuous range from 150 kc. to 15 000 kc., switching between bands being accomplished by turning a crank which connects the proper coils and at the same time moves the corresponding tuning scale and indicator into position. Besides the band-change and tuning controls there is a volume control, and a voice on-off switch and a beat oscillator on-off switch. An antenna switch connects the receiver to the trailing antenna, to the fixed antenna, or to the direction finder antennas. Each receiver serves as an emergency stand-by for the other and each is connected in the same fashion to all antenna facilities. The entire radio equipment, licensed as KHAHX, weighs not more than 300 lb.

The interphone

The integration of the radio with ship operation is obtained by a very complete interphone system which connects to each pilot position, the radio operator's position, the navigator's position, the engine mechanic, and to several other parts of the ship including the bow and the tunnel hatch. The interphone may be used for communication between any of these positions, and it may be connected by the radio operator to any transmitter or receiver, so that the pilots may talk directly with the base station or the field parties, without the necessity of "repeating" through the radio operator.

Base and field party stations

The 'other end' of the radio circuit during the expedition will consist of a base station at Humbolt Bay, New Guinea, of 500 watts input, and operated on 500 kc. and on other frequencies not yet assigned by the Dutch Government. The field parties will carry two Bendix portable outfits, consisting of three 40-pound units (transmitter, receiver and power supply) each unit carried by one man. A gas-driven portable generator acts as power supply, and each transmitter supplies 15 watts cw and 5 watts phone on 6425 kc., crystal controlled. Operated from temporary antennas, it is expected that this portable equipment will maintain contact with the plane or the base station during each encampment, and hence permit daily field party reports.



Bendix radio equipment as installed in the Archbold Expedition's Consolidated flying boat.

AIR NAVIGATION

Finding Your Way in the Air

III. DEAD RECKONING

By
Lt. Comdr. P. V. H. Weems
U S N Retired

THE THEORY OF DEAD RECKONING IS NOT DIFFICULT, the problem being to leave a known point and travel an estimated distance on an estimated course and arrive at an estimated new position. Unfortunately, the problem is seriously complicated by the effect of wind on a plane in flight. We have means for setting and steering a course and measuring the speed through the air with fair accuracy, but we have not yet solved the problem of finding and applying accurately and easily the effect of wind on the speed and course of the plane. Therefore, when we take up the subject of Dead Reckoning we will deal largely with equipment and methods for determining the wind effect and applying it accurately to the true course and air speed of the plane.

In calm air the magnetic compass provides a course which may be steered within a degree. By calibrating the air speed meter and by correcting it for temperature and pressure, the air speed is indicated correctly to within two to four per cent. A performance indicated by these figures would make air navigation extremely simple. However, when we introduce a wind effect of an unknown amount, together with an uncomfortable motion to the plane itself, the accuracy of dead reckoning navigation fails from both physical and psychological reasons. In the first place it is difficult to observe the wind effect accurately from a moving plane, and even when the wind is correctly known, the average pilot has so little trust in his ability to accomplish accurate Dead Reckoning, he does not set and steer the best possible course and has a tendency to be content with inaccurate dead reckoning and to depend too much on aids to navigation.

There has been a rapid change in the equipment and technique for accomplishing dead reckoning. Formerly, it was the custom to use special Dead Reckoning Tables, and these are still used to some extent. The present preferred practice is to use some such computer as the Dalton Mk VII which is the most popular type for *applying* wind effect when the force and direction of the wind are known. For *observing* wind force and direction, it has become necessary because of high speeds, to take observations from inside the plane.

The modern technique and equipment for dead reckoning usually employed are as follows:

Equipment.

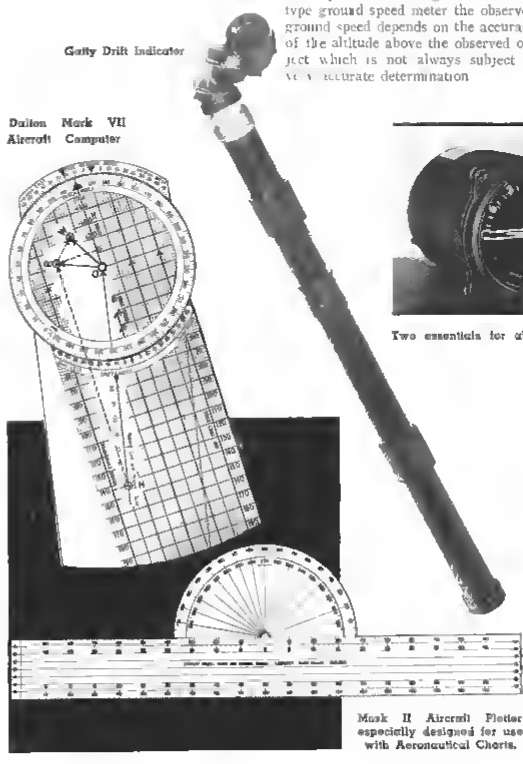
Aperiodic Magnetic Compass
Usual Panel Instruments
Stop Watch or other suitable Timepiece
Navigation charts as required and Aircraft Plotter
Floor or Periscopic type Drift Indicator or combined ground speed and drift meter
Mark VII or other computer

Technique: The proper chart or charts are selected and spread out for study. With the Aircraft Plotter, the desired track course is laid out and sub-divided into convenient time or distance intervals, say 20 miles or ten minute intervals, as an aid to keeping track of the plane's position. In this connection the beginner should make a careful study of the use of the plotter and charts and should do considerable practice work in order to develop speed and accuracy.

After the true course is laid down on the chart, the [illegible] and deviation of the compass is applied so that the compass course for each leg of the flight may be written directly on the chart. Since the wind drift is variable and cannot be foretold with accuracy, it is not feasible to prepare in advance what compass course, allowing for drift, must be steered.

For scheduled transport flying it is customary to make an analysis, the selected horsepower, altitude, track, and load, together with estimated wind, are used to find the *Estimated Time of Arrival*, abbreviated E T A. After the completion of the flight a report is made showing actual performance in the air and the actual time of arrival. Experienced navigators turn in an E.T.A. which is usually surprisingly close to the actual schedule laid down in advance for the trip.

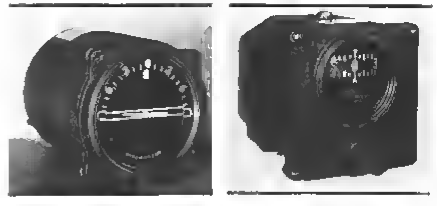
Heretofore drift observations in the air have not always been utilized, although it is obvious that the navigation will be in error in direct ratio to the error in the estimated wind. Drift may be observed with the best types of drift indicator, such as the Gatty Drift Indicator shown, to within a degree by a skilled navigator. Ground Speed may be observed along the course by means of the Gatty Ground Speed and Drift Meter (not shown). In this last device a clock mechanism moves a grid at a constant speed such that the eye of the observer at an adjusted position sees the grid moving at the apparent speed of the ground. Mathematically, the principle is that of similar triangles of which the grid speed and distance of eye above the grid are proportional to the ground speed to be determined and the altitude of the plane above the ground. In this type ground speed meter the observed ground speed depends on the accuracy of the altitude above the observed object which is not always subject to very accurate determination.



Gatty Drift Indicator

Dalton Mark VII Aircraft Computer

Mark II Aircraft Plotter especially designed for use with Aeronautical Charts.



Two essentials for air navigation: Left: Sperry Gyro-Horizon; Right, Sperry Directional Gyro

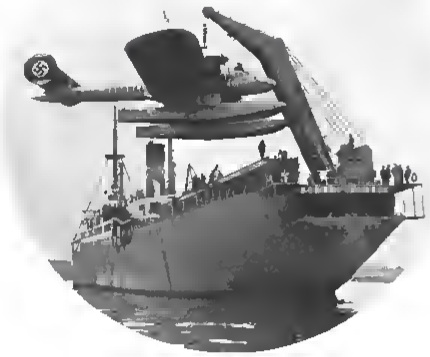
Ground speed may be determined with greater accuracy by observing the drift on two or more headings and then utilizing the air speed as the scale factor for finding ground speed. The accuracy of this method assuming the air speed meter corrected reading is accurate, is good, say to within two to four per cent. To use the double drift method for ground speed, find drift on course 45 deg to right of course and then 45 deg to left of course, then either graphically or by computer find the ground speed determined by the air speed (corrected) and the two or more drift observations.

Dead reckoning as usually done, consists largely of finding and applying the wind drift, and of solving speed-time-distance problems. Where known landmarks are available from time to time, the track and ground speed are easily determined and since with each object identified a new departure and Dead Reckoning record may be started, this type problem are the ones most used. For example, a plane leaves an airport at zero hours and after flying 42 minutes on course 78 deg true at a corrected air speed of 153 m p h, wishes to check the plane's position. The first operation is to find the Dead Reckoning position for the course and distance flown. This may of course be done by plotting on a chart. It may also be done by traverse tables as used at sea. In practice, the most efficient way is to compute the distance by means of a circular slide rule designed especialy for handling miles and tenths of miles and hours and minutes, then to step this off on the sectional or regional aeronautical charts by means of the MK II plotter, which is especially designed for use with these charts.

By plotting the plane's Dead Reckoning position, the navigator will know what landmarks to expect, and what

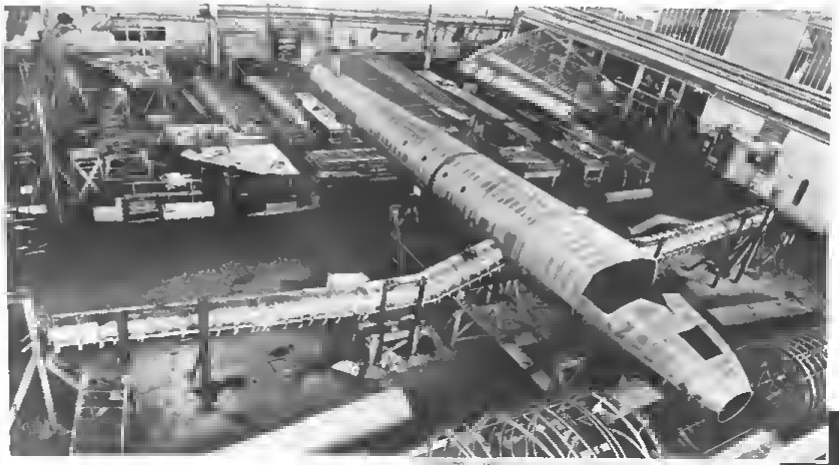
(*Turn to page 76*)

North Wind and North Sea



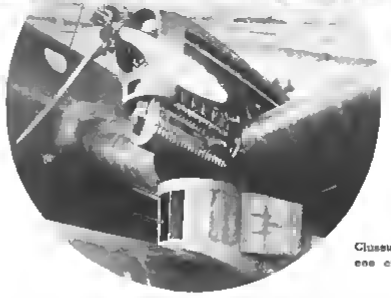
The North Sea is lifted aboard the mother ship "Schwabenland".

Lufthansa resumes its experimental work on North Atlantic routes with the heaviest equipment yet to be catapult-launched.



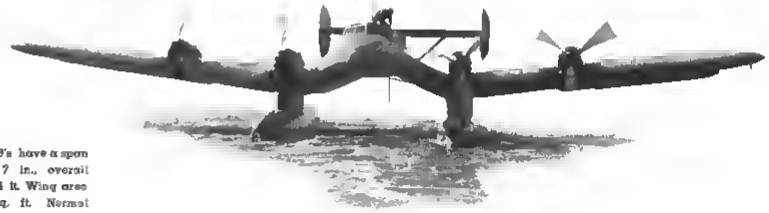
Many design details are visible in this factory assembly shot. Note circular fuselage also circular spars. Center section of spar is welded sheet steel with outboard section of riveted Alclad like sheet.

Detail of the float connections. The supporting member is a short tubular steel stub welded to the wing spar and riveted to the float.

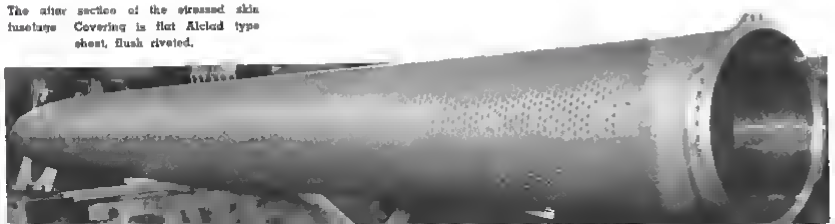


Closeup of installation of one of the Junkers Jumo 205 engines

The tail surfaces showing twin fin and rudder combination with rectangular stabilizer mounted on stub fin built integral with fuselage. Fixed surfaces are all metal flush riveted movable controls are largely fabric covered.



The HA 139's have a span of 80 ft. 7 in., overall length of 64 ft. Wing area is 1,359 sq. ft. Normal crew—four



The after section of the stressed skin fuselage. Covering is flat Alclad type sheet, flush riveted.

When the twin float four motored "Nordmeer" settled down on Manhassett Bay at 7 37 A M August 16th she completed the first schedule inaugurating Germany's trans-Atlantic experimental program for 1937. Following shortly will be her sister ship "Nordwind." Between them they are scheduled to make a number of Atlantic crossings before winter sets in.

Radical in design, these ships are the heaviest aircraft ever designed for regular catapult launchings. Their takeoff weight (for catapulting) runs over 18½ tons. They were designed to meet Lufthansa specifications for a seaplane capable of carrying a payload of 880 lb over a distance of 3100 miles, at an average cruising speed of 156 m p h. For rough water takeoff (for the same payload and speed) the range called for was only 625 miles.

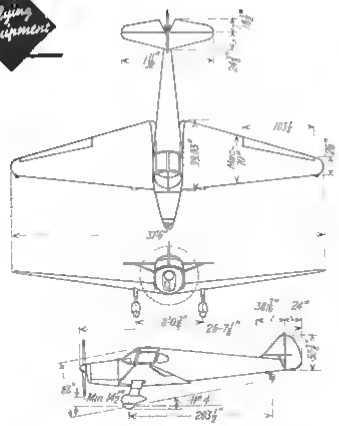
These machines (official designation HA-139) were produced by the Hamburger Flugzeugbau under the direction of Dr. Ing. R. Vogt and built in the shops of Blohm & Voss, Hamburg. Power plants are Junkers Jumo 205 diesels, developing a total of 2400 hp (max.) at sea level. The propellers are Junkers controllable pitch built under Hamilton-Standard license.

The crew consists of 2 pilots, 1 radio operator and 1 flight mechanic. All four are stationed in one operating compartment with power plant control panel on the port side and radio installation to starboard, both behind the pilots. Mail and freight are carried in a hull compartment immediately behind the wing spar. Cargo room is easily accessible from the cockpit, in fact, access to the cockpit is through a trapdoor in the floor of the cargo pit.

Although aerodynamic considerations were paramount in the design, special attention was given to good water characteristics, especially when drifting in rough seas with engines stopped. Tests have also indicated that the performance of the ships is even better than was anticipated. It was found that takeoff from the water may be accomplished in less than 30 seconds with a load corresponding to a flying range of 2180 miles. Also level flight can be maintained fully loaded on any three engines, partly loaded on two.

T Claude Ryan showing easy step to wing walk way cabin entrance on new Ryan S-C

Flying Equipment

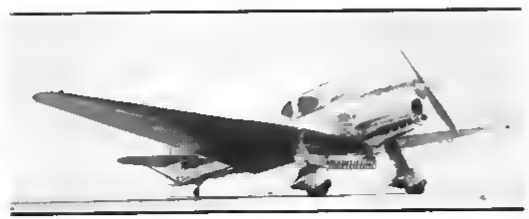


RYAN re-enters the Cabin field with Model S-C

An interesting new design combines ruggedness, economy, performance and eye appeal

DEVELOPED TO MEET AN INSISTENT DEMAND for a small cabin plane of the most modern type, the Ryan S-C strikes a fine balance among the many qualities desired in the small airplane for business and pleasure use. For friend and foe alike the S-C will likely prove one of the easiest planes to praise and hardest to criticise that has appeared in many a moon. Although distinctly different in general design from the S-T, the S-C has in common with the open Ryan a distinctive eye-appeal.

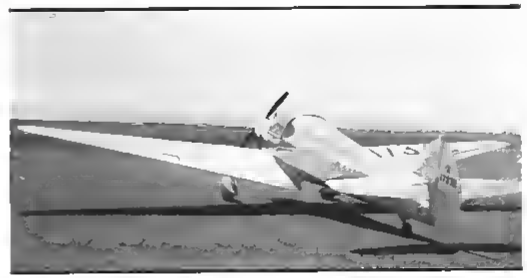
Featuring extreme accessibility and generous roominess the cabin is reached by a walkway along either wing root and can be entered as easily from either side. The entire upper forward part of the cabin consists of a sliding hatch which moves backward 27 inches for ready access, leaving no obstructions to require stooping in entering. Front seat has an inside width of 43 inches, seating the pilot and passenger side by side. The third passenger occupies a single rear seat bench that is 40 in. wide, and there is ample room for forty pounds of luggage. Inside length of the cabin is 74½ in., and height is 50½ in. Interior finish is with Landlaw upholstery. Seats are designed for either chair type or seat-pack parachutes. Dual controls are standard. The Shakespeare type throttle being mounted in the center of the instrument board. Wheel brakes are set with a hand lever and operate differentially on both sets of foot pedals. Cabin ventilation and heat control is standard equipment. Vision is equally good from either right or left side, the pilot's eye level being 10 in. above the cowling line, the cowling sloping forward at an angle of 6½ degrees to give full forward vision even in taxiing. Both the forward windshield and overhead sliding hatch are covered with Röhm and Haas Plexiglass, giving the same degree of upward vision as in an open low wing monoplane. Vision forward is further improved by the low frontal area of the inclined Menasco C4S engine. The sliding hatch may be opened or closed in flight, operating on ball bearing rollers and with a latching arrangement for holding the hatch open at intermediate points. Thus the new Ryan may properly be considered as a convertible-coupe type airplane.



Ryan S-C. Flap extended

Following the principles of simplified all-metal construction as developed with the S-T, the new Ryan cabin plane has a monocoque fuselage of thick-skin, 24 ST Alclad over rugged transverse rings. The cantilever wing employs a novel mono-spar construction developed by Ryan which combines features of simplicity serviceability and the most modern structural and aerodynamic technique. Wing structure is entirely of metal, with metal covering over the forward portion of the wing and cloth covering of the trailing portion. This produces a wing structure which has a center of gravity coinciding with the center of lift. This together with use of a new NACA airfoil section of stable center of pressure characteristics, produces a wing free of any tendency to flutter under any condition. Ailerons are metal structured of steel and dural, balanced both statically and dynamically. A single perforated dural flap of split type beneath the wing at a point about one third back from the leading edge is a new approach to the landing problem. Light wing loading gives the new Ryan unusually good landing characteristics. The new type flap (see picture) serves purely as an air brake to reduce the glide and does not affect normal handling of the plane in any way. Tail surfaces are also of steel and dural structure with cloth covering. Mounted quite high the horizontal stabilizer is braced to the fuselage by a single streamlined strut on each side. This high mounting of the stabilizer, together with a new type wing root fillet entirely eliminates buffeting. A tab adjustable on the ground is incorporated in the rudder, and longitudinal trim in flight is by a trailing edge elevator tab controllable by a conveniently located crank.

l to r: William C. Boyd, chief engineer; Sam Breden, sales manager; T. Claude Ryan, president, Ryan Aeronautical Co. Showing ease of access to cabin from either side



Note wing root cut-away type filleting to fuselage

Performance and flight characteristics of the plane, on the basis of many hours of flight testing conducted prior to and during all tests for government approval, are exceptional. The plane is reported difficult to stall, and when stalled, to settle evenly with full aileron control to a position with the nose only slightly below the horizon. The plane must be forced into a spin and will recover quickly when controls are neutralized. A safe landing results even when the plane is levelled off at relatively high altitude and landing speed is reported in the neighborhood of 45 m.p.h. Top speed is given as 152 m.p.h. at 3,000 ft. altitude, with a cruising speed at this altitude of 136 m.p.h. and a cruising speed at 5,000 ft. of 140 m.p.h. Much of the credit for this performance must be attributed to the supercharged Menasco engine.

Due to the quite low center of gravity of the plane the brakes can be used very effectively. All controls are light and responsive yet stability is positive, permitting indefinite flying

(*Turn to page 46*)

NEVER BEFORE

Endurance

LIKE THIS!

AIRPLANE OPERATORS are finding increased engine life and more flying hours between required overhauls — by using the New Texaco Airplane Oil, recently announced

This new oil gratifies the aviation industry by the practical elimination of wear. Microscopic examination of engine parts at overhauls amazes inspectors.

New Texaco Airplane Oil gives this remarkable result because it keeps your engine *clean* — free from harmful deposits, assuring full power and fuel economy

Trained aviation engineers are available for consultation on the use of the New Texaco Airplane Oil, now on sale at principal airports.

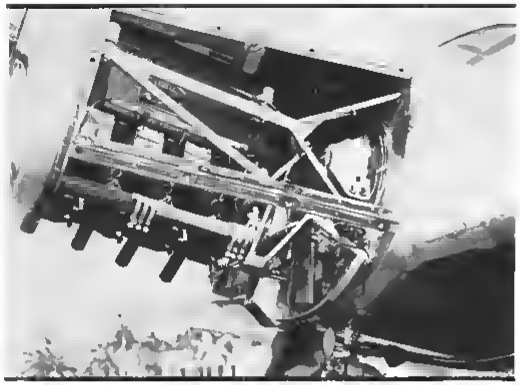
Refill with New Texaco, and in this way improve your engine's performance and add to your safety.

The Texas Company, 135 East 42nd Street, New York City.

TEXACO AVIATION GASOLINE ★ NEW TEXACO AIRPLANE OIL FOR ENGINE CYLINDERS AND BEARINGS, SUPERCHARGER BEARINGS AND DRIVE GEARS ★ TEXACO OIL FOR MAGNETO AND STARTER BEARINGS TEXACO MAFFAK NO 2 FOR ROCKER ARMS AND WHEEL BEARINGS

TEXACO

Aviation Products



The 150 hp. supercharged C4S Menasco in the Ryan SC.

with either hands or feet off the controls.

Landing and taxiing control is made even more effective through use of full swiveling Goodyear streamlined tailwheel mounted on a hydraulic shock absorbing strut, coupled with wide tread landing gear with oil-draulic struts of 6 in travel, and equipped with Goodyear Airwheels. Landing gear tread is 8 ft. 4 in. In appearance the new Ryan is the last word in modernity. Polished aluminum finish as on the S-T, helps to achieve this result. Clean lines, single strut cantilever type landing gear and sharply tapered cantilever wings also lend a distinctive note, which is further enhanced by the rakish cabin fairing and novel filleting at the wing root to give this plane a strikingly bird-like appearance, even though of low-wing design.

Standard equipment is unusually complete and there is ample provision for fitting such optional equipment as engine driven generator, retractable landing lights, radio, etc. The wide cabin gives ample room for additional instruments on the board, such as turn and bank indicator and clock. Lord rubber bushing mounts are standard on the flight group of instruments. Final touch is provision of electric starter.

Standard equipment is as follows: Dual controls, dual brakes, cockpit ventilation and heat control, wing flap, elevator tab adjustable in flight, complete landing gear fairing, swivel tail wheel mounted on hydraulic shock strut, Goodyear Airwheels, wiring for position lights, fuel gauge, reserve fuel supply, Reading battery, Laidlaw upholstery throughout, parachute type seats, Fireguard fire extinguisher, engine manual, log book, first aid kit, Eclipse Y-150 electric starter.

Standard instruments include Altimeter, airspeed indicator, tachometer, compass, manifold gauge, oil pressure gauge and oil temperature gauge.

Optional instruments and equipment include thermocouple, turn & bank indicator, rate of climb indicator, clock, radio, Grimes retractable landing lights, landing flares.

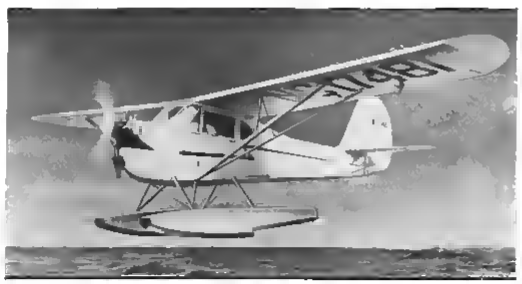
Used in the plane are 24 ST Alclad, Wellington Sears B-30 fabric, Fuller dope, Maewhyte control cable, Fafnir bearings for all controls, Goodyear airwheels and brakes, Eclipse starter, Menasco engine, Ryan seats, and Ryan oil-draulic shock struts, Reading battery.

Length overall	26 ft. 7½ in.
Span	37 ft. 6 in.
Height	7 ft.
Wing area	202 sq. ft.
Wing loading	10.4 lbs. per sq. ft.
Power loading	14 lbs. per sq. ft.
Empty weight	1300 lbs.
Useful load	800 lbs.
Pay load	3 people 40 lbs. baggage.
Gross weight	2100 lbs.
Fuel capacity	37 gal.
Oil capacity	3 gal.
Max. speed	152 m.p.h. (3,000 ft. altitude)
Cruising speed	136 m.p.h. at 3,000 ft.
Cruising speed	140 m.p.h. at 5,000 ft.
Landing speed	45 m.p.h.
Rate of climb	800 ft. per minute (sea level)
Service ceiling	19,400 ft.

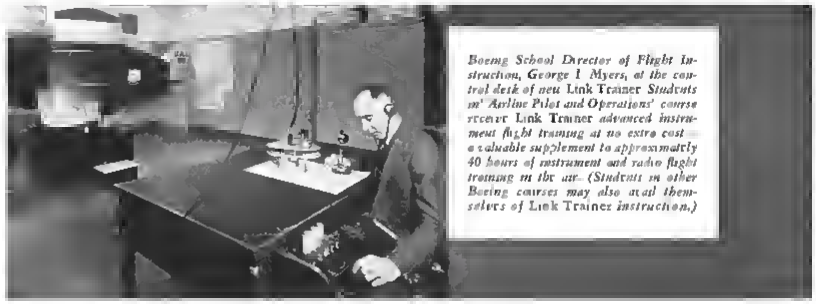
Aeronca Seaplane

Edo float equipment adds utility to a popular model

LICENSED BOTH AS A LANDPLANE AND SEAPLANE the new Aeronca K high wing monoplane is proving popular as a successor to the veteran wire-braced Aeronca monoplane, and a logical companion to the Aeronca low-wing. Seating two people side by side in a roomy cabin, with dual wheel controls, the model K is modern in every detail. Landing gear is semi-cantilever, improving the plane aerodynamically and adding to the increased performance. Powered with the Aeronca E-113C two cylinder 40 h.p. engine the model K has a gross weight of 1,040 lbs., a top speed of 93 m.p.h. and a cruising speed of 80-85 m.p.h. Equipped with Edo floats the model KS seaplane has a gross weight of 1130 lbs., high speed of 85 m.p.h. and cruising speed of 75 m.p.h.



The Aeronca as a Seaplane—Equipped with Edo Floats



Boeing School Director of Flight Instruction, George I. Myers, at the control desk of new Link Trainer. *Students in* Airline Pilot and Operations' *courses receive* Link Trainer *advanced instrument flight training at no extra cost—a valuable supplement to approximately 40 hours of instrument and radio flight training in the air. (Students in other Boeing courses may also avail themselves of* Link Trainer *instruction.)*

Bell XFM-1

Extraordinary striking power in a new ship of radical design for the Air Corps.

A group of the Army's crack pursuit pilots were astonished when they visited Buffalo not long since to see the fighting airplane of the immediate future as executed by Bell Aircraft Corporation for the Air Corps. Accustomed as they were to tiny single-seaters with open cockpits so cramped with gadgetry that pilot comfort and convenience are often lacking, they had to revise their thinking processes radically to take in this 5 man fighter with its twin engines and guns. They looked with approval on the enclosed, heated stations for all members of the crew with their inter-communicating telephone sets and noted that all personnel on board could conveniently change places in flight.

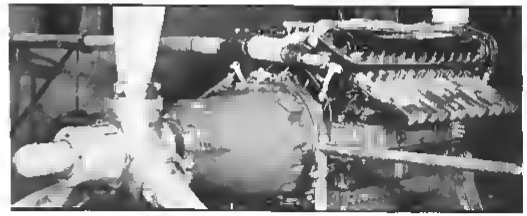
Most radical, however, and a feature that seems to have so many advantages from the military point of view that it is astonishing that it had not been developed before this, is the pusher arrangement of the power plants. The two Allison liquid-cooled engines are mounted outboard from the fuselage in nacelles but they drive to the rear, being connected to three-bladed, constant-speed, electrically controlled propellors. Although expected to give increased propeller efficiency, the arrangement is of greater importance from a military angle, as it permits locating gun positions in the nose of each nacelle where gunners not only have a free field of fire and of observation forward, but may work unhindered by propeller blast.

No airplane that we know of has ever carried such a formidable weight of armament as this super-fighter with its six guns. Racks are also provided along the underpart of the center section for light bombs.

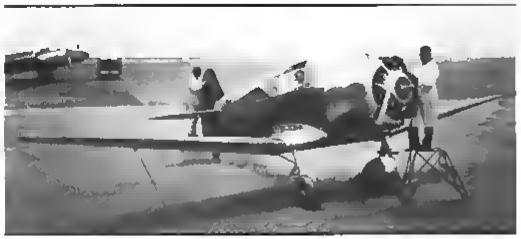
With such armament, and with a predicted top-speed greater than that of any existing or projected bombers the potential striking power of the XFM-1 makes it one of the most formidable military weapons ever built.

The Bell fighter is a low-wing all-metal monoplane with completely retracting landing gear. Trailing edge wing flaps are provided. No gasoline is carried in the fuselage or in the nacelle, but is all carried in integral compartments in the wing structure. An interesting feature is the fitting of a complete auxiliary gasoline-driven power plant which supplies power for lights, radio, starters, retraction mechanism, etc. The independent power plant drives nine electric motors.

After initial shakedown flights at Buffalo, the plane will be flown to Wright Field for completion of experimental tests. After going through the jumps, General Westover is planning to send the fighter to join the GHQ Air Force at Langley Field.



Allison engine and Curtiss-Wright propeller



Advanced Trainer

Boeing School project to be test flown in September

Boeing School of Aeronautics has just announced completion of the Boeing School Advanced Trainer, a two-place, low-wing, all-metal monoplane with a gross weight of 3,200 pounds and an estimated cruising speed of 223 miles per hour at 10,000 feet.

T Lee Jr., General Manager of the school, set his organization to work on the design of this plane in 1933. Intended for advanced flying instruction of long distance, cross-country flight training, it incorporates the same general characteristics of multi motored commercial transports as to speed, wing loading and take-off characteristics. Said Mr. Lee:

"Our purpose in designing and building this training plane was solely to provide a training aircraft that would qualify the student transport pilot in the handling of a plane with characteristics similar to those of modern, high performance transports. With the growing trend toward faster, higher aspect radio transports with higher wing loadings, the Boeing School of Aeronautics foresaw the need for the development of a new type of training plane which would prepare students for changed flying characteristics of the new airliners.

The building of the Boeing School Advanced Trainer was accomplished entirely within the organization of the school, which is unusually self-contained. We designed the airplane, we taught methods of construction, we built it, we conducted all static tests and stress analyses, and we will test fly it and obtain a license for it."

The actual design of the plane was undertaken in 1933 by Don Thorp, member of the Boeing School faculty in design, drafting and construction. Thorp graduated from the school in 1931 and spent a year in the Engineering Department of the Boeing Airplane Company at Seattle. In 1932 he returned to the Boeing School faculty and the following year began design of the Advanced Trainer.

The engineering and construction work came under the supervision of Walter McGinnis, faculty member in charge of engineering, and much of the construction work was under the direct supervision of David Retan, in charge of the sheet metal shop at the Boeing School. An important feature in the building of the plane is the fact that all students in engineering as well as those enrolled in shops participated in the work on the airplane and no one single unit of students carried out all the work.

With a wing loading of 23.3 pounds per square foot and aspect ratio of nine to one, the machine meets Mr. Lee's requirements for the new type of training aircraft.

The fuselage is of semi-monocoque construction, duralumin throughout. The large cockpit, providing unusually good visibility, is covered with a sliding hatch of dura-plastic glass. The wing is of stressed skin monospar construction, likewise of duralumin. The streamlined landing gear is non-retractable and the wings are equipped with hydraulically controlled flaps.

The trainer is powered with a Wright 7-cylinder Whirlwind engine with 320 h.p. at 2200 r.p.m. The powerplant is equipped with a Constant Speed Hamilton Standard Propeller.

Dimensions

Span	34 ft. 1½ in.
Length	24 ft. 8¾ in.
Tread	8 ft. 2½ in.
Propeller Diameter	8 ft.

Areas

Wing	137.3 sq. ft.
Aileron	13.0 sq. ft.
Stabilizers	12.9 sq. ft.
Elevator	11.3 sq. ft.
Elevator tab	1.1 sq. ft.
Fin	5.9 sq. ft.
Rudder	7.6 sq. ft.

Weights and Loadings

Empty	2315
Disposable Loads	885
Gross Weight	3200
Wing Loading	23.3 #/sq. ft.
Power Loading	10.0 #/H.P.

Power Plant

Engine—Wright 7 cyl. Whirlwind R-760E2 320 H.P. at 2200 R.P.M.
Propeller—Constant Speed Hamilton Standard.
Fuel Capacity—68 gals., Oil Capacity—6 gals.

Performance (Estimated)

Minimum Speed	65 (Flaps)
Maximum Speed	226 (Sea level)
Cruising Speed (225 hp)	200 (Sea level)
Cruising Speed	223 (10,000 ft.)
Cruising Speed	206 (13,000 ft.)
Endorance (13,000 ft.)—4.25 Hrs.	
Range (13,000 ft.)—875 miles	
Rate of climb (initial at sea level)—200 ft/min.	

Equipment

Two way radio, complete instruments, night flying equipment.

THE HERRICK Flying Equipment Vertaplane

By Ralph H. McClarren, A.E.

Asst. Associate Director of Engineering at The Franklin Institute

LONG HAS BEEN THE SEARCH to find suitable means for increasing the lift of an airplane without adding unnecessarily to the actual area of the wing or weight of the plane. High Lift Devices we call them,—slots, flaps, variable area wings, multi-slotted wings and rotating wings are but a few of them. In the Herrick Vertaplane one finds a fundamentally new application of already known methods to obtain high lift without increasing actual wing area and without necessarily at a material sacrifice of other performance characteristics. The upper rotor wing of the biplane combination is symmetrical along the center line of the span and is devised so it can be released from the fixed position, started to rotate, and will continue to rotate and operate as any rotating wing type thus combining the steep descent—slow landing characteristics of the rotating wing plane with the high speed and efficiency of the airplane. To date seven conversions from airplane to gyro have been made in the air, one at 1,500 feet altitude.

The Herrick Vertaplane looks much like a conventional 2 place-side-by-side-tapered wing, biplane having the following general specifications:

Span upper wing	24 ft
Span lower wing	22 ft
Area upper wing	70 sq ft
Area lower wing	100 sq ft
Total wing area	170 sq ft
Disc area upper wing	452.4 sq ft
Airfoil upper wing	Herrick H-7-11
Airfoil lower wing	Clark Y-15 tapered
Engine—Kinner B-5	125 H.P.
Gross weight	1,700 lb.
Power loading	13.6 lb./H.P.
Wing loading	10 lb./sq ft.

Performance figures are not available for publication at the present but suffice it to say that the Vertaplane even in its present laboratory and experimental form has a top speed in excess of 100 m.p.h. and a landing speed below 30 m.p.h.

The most outstanding feature, considering the craft from a high lift view point, is the tremendous increase of effective wing area gained by releasing and rotating the upper wing. The area increases from 70 sq. ft. to 452.4 sq. ft., or 6.3 times. This with but slight loss in maximum lift coefficient for wing vs. rotor and at the same time jumping the angle for maximum lift from 15 to 35 degrees.

Mr. Herrick started his work in 1927 by first developing a profile that would be efficient as a wing yet be symmetrical about a vertical centerline to make possible its immediate adoption to a rotating wing without turning one-half of the wing around to get leading and trailing edges in their proper relation. After having made many tests in the wind tunnels at New York University, he developed the Herrick Profile.

This profile is essentially distorted ellipse of very small minor axis and large major axis (chord). The elliptic shape is plotted about a mean camber which is the arc of a circle. Thus leading and trailing edges are identical and the incidence is built into the profile. As a wing, the model when tested gave an L/D as high as 22 and a relatively low profile drag. When tested with the wing rotating, the maximum lift coefficients were greater than those obtained on the autogiro or gyroplane type.

The development of such a profile

(*Turn to page 76*)

Above: The Herrick Vertaplane at the moment of conversion. Below: Rotor locked for take-off as a normal biplane.

With Foreign Builders

A review of new flying equipment from overseas

FOLLOWING ANNOUNCEMENT of the new French operating company "Compagnie Air France Transatlantique" for spanning the North Atlantic with a French flying service, details have been released on the new Liore-Olivier No 47 flying boat which is to be used for inauguration of the service. This flying boat is a four engine high wing semi-cantilever monoplane with a span of 97 ft, gross weight of 17 tons, and powered with four 869 h.p. Hispano-Suiza liquid cooled engines mounted in tandem in two wing nacelles built on the top surface of the wing. Total h.p. is 3,440 and top speed is reported at 220 m.p.h., with 200 m.p.h. for cruising, making this the fastest large flying boat in service.

A far sight into the future—since the job may consume all of two years—is the French Air Minister Pierre Cot's order for a new flying boat for operations on North and South Atlantic routes. The Liore et Olivier 49 will have many new characteristics unknown to its precursors, LeO 24 and LeO 47. With 40 passengers, mail and freight weighing 4,400 lbs., the total payload will reach 11,000 lbs. At 200 m.p.h. it is expected to cruise twenty hour non-stop. It is to cover the distance on the present run between Natal, Brazil, and Dakar, West Africa, in ten hours.

A reconnoitering plane of the MIP-94 type is being introduced in the Japanese Army. It is a biplane with a span of 12 m (39 ft.), length of 8 m (26 ft.), total weight 2,600 kg (5,732 lb.), cruising speed of 300 km/h (186 m.p.h.). With its engine of 550 h.p., the MIP-94 climbs to 3,000 m (9,842 ft.) in 9 min. Its ceiling is 8,000 m (26,247 ft.).

Flying both the Pacific and Atlantic oceans in one hop, thumbing their noses at the North American continent as they zip over, is the program of Japanese fliers who are grooming the new super long range monoplane recently designed by the Institute for Aeronautical Research of Tokyo Imperial University, and built at the Tokyo Gas Denki Works. First test flights were scheduled at Kagamigahara Military Aerodrome. Construction is "of the most modern" with fabric covered wings using steel monospar structure. Fuselage is of dural unmm monocoque construction. An 800 h.p. Kawasaki engine. Prestone cooled and equipped with a controllable pitch metal propeller is mounted. With an empty weight of 7,000 lbs. the plane is reported to lift a fuel load of 12,000 lbs. Span is 92 ft., length 49 ft., height 12 ft. and wing area 936 sq. ft. Range is estimated as approximately 10,000 miles.

The Liore-Olivier flying boat.

Japanese Long Range Monoplane

Chechoslovakia's 10th National Aero Show held in Prague has yielded a companion to the Bata concern's Zlin XII (described in AVIATION, June, 1937). The Zlin XIII, still a novelty in Europe, is a cantilever low-wing monoplane of a clean design and wooden construction. This sports two-seater mounts a Walter Major-4 engine of 130 h.p., with which it is claimed to be capable of over 200 m.p.h.

A number of other newcomers have emerged at the show. One of these was the Praga E-115 two-seater high wing monoplane with an enclosed cabin. This is a descendant of the Praga Baby produced in England under a license. Its maximum speed of 111 m.p.h. and cruising speed of 100 m.p.h. are furnished by the air-cooled Praga D flat-four engine of 65 h.p.

The only commercial type shown was the Aero A.204, a metal monoplane with a retractable undercarriage. It takes on a crew of three and eight passengers. Its span is 62.3 ft., length 42.6 ft., weight loaded 9,480 lb., speed 200 m.p.h. with 2 Walter Super-Castor engines.

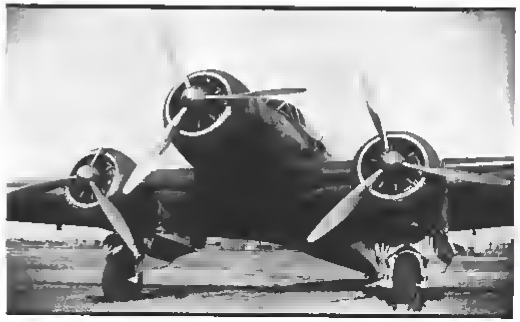
With an alleged speed of 310 m.p.h., the Avia 35 single-seater pursuit stood out in the war aircraft division. This low-wing cantilever monoplane is of all-metal construction, its engine has an output of 1,000 h.p.

The Tatra Works showed T-1, the first plane to be both designed and built on their premises—as well as three trainers. Other low-wing cantilever types were brought by Mraz and Benes. Among the engines, the British products predominated, although there were some domestic specimens, like the latest direct-drive Praga D flat four of 2.8 litres capacity yielding 80 h.p. at 2,520 r.p.m.

Two unusually handsome sport airplanes have been introduced in Czechoslovakia by the firm of Benes-Mraz both to the designs of P. Benes. Known respectively as the BIBI Be 550 and the Beta Minor BE 51 the planes are low wing cabin monoplanes with cantilever bracing of wings and tail surfaces, and powered with in-line engines. The BE 550 uses a 50 h.p. Walter-Mikron engine and carries two people side by side at a maximum speed of approximately 112 m.p.h. The BE 51 uses an 85-95 h.p. Walter-Minor engine and carries two people in tandem at a maximum speed of about 125 m.p.h. Both planes are of wood construction throughout.

A high performance general purpose military schooling plane has been introduced in Germany by the Arado Flugzeugwerke. Known as the Arado Ar 96 the plane is all-metal of low wing cantilever monoplane design, with duralumin sheet monocoque fuselage and dural covered wing. Flaps and retractable landing gear are incorporated. Built to serve for all-around instruction in flying of all types, and training in photography, bombing, aerial machine gunning and radio navigation and communication. Powered with a 300 h.p. inverted Vee 8 Argus air cooled engine, the Arado has a maximum speed of 202 m.p.h. and a cruising range of 560 miles. Span is 36.1 ft., length 27.4 ft., Height 8.7 ft., wing area 184 sq. ft. Weight empty 2117 lbs., gross weight 3076 lbs., wing loading 16.7 lbs. power loading 12.8 lbs., landing speed 50 m.p.h. and ceiling 18,000 ft.

BIBI Beta-Minor BE 51



Savoia Marchetti tri-engined monoplane

All around excellence of the Italian Savoia Marchetti three engine monoplane continues to be demonstrated, the latest news being in connection with new speed records over the 1000 km. distance carrying 500-1000 and 200 kilograms load. Piloted by Lieut. Bruno Mussolini, and Lt. Col. Attilion Biseo, the plane, powered with three Piaggio P X1 RC 40 engines, made an average speed of 423 kilometers per hour to better the existing record of 390 km. p.h. by 33 kms. and incidentally to bring world leadership in total air records held again to Italy, wresting this mythical crown from the United States.

Among the latest aerial Lizzies are two speedy sports models LIG-5 and LIG-8, built under the direction of Engineer Glukhikh at the Holtzman Aviation Institute of Leningrad.

All-wooden, the LIG 5 is noted for removable panels which convert it at will into either a one or two-seater. In the first instance it is a low wing monoplane, in the second a sesquiplane. The LIG 5 span is 8 m. (26 ft.), length 8 m. (26 ft.), height 2 m. (6½ ft.). The fuel load permits a 3½ hr. flight which may be extended to 5½ hrs. with the installation of a reserve tank. Maximum speed is about 300 km/h. (186 m.p.h.).

Three passenger seats are to be found in the LIG-8 which is designed for distance performances. Its designers are expecting of it approximately 6,000 km. (3,728 miles) nonstop at the cruising rate of 275 km/h. (171 m.p.h.).

(*Turn to page 80*)

Arado monoplane

Congratulations Pan American

ON RECEIVING

The Collier Trophy

ONCE, a dream in the minds of men; today, an accomplished fact. In such wise is the history of aviation's progress written—by the men and machines who make daily realities of yesterday's impossibilities.

Of the part played by Martin-built Clippers in the spanning of the Pacific by Pan American we are indeed proud.

For these three ships are the first of their kind—conceived, designed and built by us for Pan American nearly two years ago—and even now, the only three flying boats in the world capable of maintaining scheduled service across the Pacific Airway with substantial commercial pay loads of passengers, mail and express.

Our congratulations to the organization and the men who operate these ships.

THE COLLIER TROPHY:
Awarded annually by the National Aeronautic Association for the greatest achievement in aviation in America, the value of which has been demonstrated by actual use during the preceding year

THE CITATION FOR 1936:
"To Pan American Airways for the establishment of the trans-Pacific airline and the successful employment of extended over water navigation in the regular operation thereof."

The Glenn L. Martin Company

Builders of Dependable Aircraft Since 1909

TRADE MARK

BALTIMORE, MARYLAND, U. S. A

Buyers' Log Book

What's New In Accessories, Materials, Supplies, and Equipment

Coffing Wing Jack

Wing Jack

A new utility tool for maintenance shops

EVERY MAINTENANCE SUPERINTENDENT should be interested in the new Coffing Wing and Tail Jacks which are being manufactured by the Coffing Hoist Company of Danville, Illinois. The new Coffing Wing Jack enables the maintenance crew to check landing gears, tires, wheels, brakes and to lower the plane while overhauling motors with a minimum amount of time and labor. By using these jacks the plane may be lowered to a minimum height of 30 inches and raised to a maximum height of 72 inches, and lift a capacity load of 12 tons. They may be wheeled into position and operated by one man.

The new Coffing Tail Jack has the same basic features as the Wing Jack and can be used for repairing tail gears, removing wheels and changing tires. It has a minimum height of 22 inches and a maximum height of 56 inches, a lifting capacity of 2 tons.

These jacks are now part of the maintenance equipment of many large airlines and are included in the maintenance specifications of the Douglas planes of American Airlines Flagship Fleet.—AVIATION, *September, 1937*

Com-Pak Chute

Switlik design for Cub and other small ships

WITH THE RISING POPULARITY OF planes in the Taylor Cub class, Switlik has designed a parachute to meet that specific demand. The Com Pak measures only 11½ in. across, but contains a standard 24 ft. canopy. It is a little thicker than usual seat packs, but when used with a special bucket seat replacement, the original cockpit head-room in both front and rear seats is maintained. Operation of a Cub from the rear seat is unhampered as there is no bulging pack protruding over the front seat to interfere with rudder controls. Supplied with a quick attachable harness the pack may be left in the seat permanently, the occupants entering and leaving the ship with harness only.—AVIATION, *September*, 1937

Switlik Com-Pak Chute designed for Taylor Cub

Automatic Reel—

Lear radio device for improved transmission

DESIGNED TO IMPROVE TWO-WAY communication and direction finding is Lear's new light antenna reel. It comes either electrically, or manually operated. The electrically operated reel is completely automatic, not only does it eject the antenna to a predetermined length, but as the plane descends for landing, retraction is complete and positive. This eliminates the possibility of forgetting to reel in when landing. The manually operated reel employs a new "free-wheeling" type brake which makes possible operation with one hand. Both pieces of equipment have been tested under all sorts of flying conditions. Both are the product of Lear Developments Inc., and are an addition to the Learadio line of aircraft communication equipment.

Lear Developments, Inc., have moved their laboratories to Suffolk Airport, Long Island, which is about eighty-five miles east of New York City on the east center part of the Island, about twenty-five minutes from Roosevelt Field.—AVIATION, *September, 1937*

Lear Automatic Antenna

Friez Weatherman—

Remote weather control for airports

DESIGNED PRIMARILY FOR AIRPORT USE, the new Friez Weatherman by Julien P. Friez & Sons, Inc., Baltimore, Maryland, provides in one compact installation a means of determining essential weather facts and transmitting them instantly to the airport operating office. This is accomplished through electric drive of instruments on the operators panel, from the outdoor mechanical units which determine wind direction and velocity. The panel may also be equipped with instruments to show air temperature and barometric pressure.—AVIATION, *September, 1937*

Automatic Wind Tee—

Gives landing direction wind or no wind

AIRPORT OPERATORS will be interested in the new Wilhelm Automatic Wind Tee which indicates landing direction automatically, wind or no wind. Operating on a gravity cam principle the tee will automatically, return to indicate the main runway when there is no wind yet will respond to any wind of 5 miles per hour or more and will accurately indicate the exact wind direction at all times. Due to the automatic cam on which the wind tee rides it is relatively steady in light gusty winds. Lighted for night operations, and measuring 23 feet in length, the Wilhelm tee is easily visible day or night. All moving parts are automatically lubricated and it is claimed that the tee will not foul regardless of ice or snow conditions. The Wilhelm tee is manufactured by Arthur M. Wilhelm, Randolph, N. Y.—AVIATION, *September, 1937*

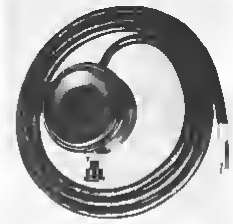
Portable Climate—

American buys 12 plane air conditioning units

EVEN AS RECENTLY AS FIVE YEARS AGO anyone suggesting that chunks of climate be equipped with wheels and driven around the landscape to where they could do the most good would have speedily found himself in nice quiet surroundings with pleasant environment and excellent service, including a nice warm straight-jacket. But that is exactly what we have in daily use by American Airlines, who are equipping with portable airplane air conditioning units manufactured by General Refrigeration Corporation of Beloit, Wisconsin. These machines are entirely self contained and, mounted on a Ford or Chevrolet truck chassis, can be driven to any point accessible to an ordinary truck. Operating without external connections, the unit has sufficient capacity to continuously heat or cool a five room house, or to establish a 70 deg. temperature in a 21-passenger plane cabin in about ten minutes elapsed time. The air conditioner has its own gasoline driven power supply, with a 15-kilowatt generator supplying current for the electric motors. A blower drives air over the Freon gas filled refrigerating coils and into the cabin of the plane through a large rubber hose at the rate of 1,200 cu. ft. per minute. For winter operation jacket water from the gasoline engine, together with four electric grids, is used to heat the air before forcing it into the plane. The truck body is soundproofed in order to reduce objectionable noise while operating in the vicinity of a loading station. This air conditioning unit also serves as a standby electric power source for emergency use in the event of failure of the main power source at an airport. American Airlines has purchased twelve of these units and placed them in service.

Use of these cooling units very greatly adds to the comfort of air passengers, emphasizing again the advantages of traveling by air.—AVIATION, *September, 1937*

Pumping cold into a Flagship



Universal Microphone

Universal Microphone—

Combines small size and clear pick-up

AN ALMOST MICROSCOPIC MICROPHONE has been introduced by the Universal Microphone Co., of Inglewood, Calif. Of single button type with molded bakelite case the microphone may be held in the hollow of either hand. It is claimed to be 100 per cent directional, and designed for exclusion of all extraneous noises.—AVIATION, *September, 1937*

Operators' Corner

An exchange of ideas on the problems of the commercial aviation industry

QUESTION 23: What methods have you used to develop group flying instruction for your school? Have you offered special rates to clubs fraternal organizations, educational institutions or similar organizations? Have you found group instruction at reduced rates worth while?

No Special Rates

WE HAVE NEVER CONSIDERED it feasible to develop group flying instruction. We do not believe we would offer special rates to clubs, fraternities and similar organizations.—A. ELLIOTT MERRILL, *President, Washington Aircraft & Transport Corp., Boeing Field, Seattle, Wash.*

QUESTION 24: The Air Commerce Bureau has been considering the possibility of licensing the managers of large airports. What do you think of the idea? To what class of airports should it apply? Is there any standard of qualifications desirable for an airport manager? If so what should the minimum requirement be? Do you think it would be possible to set standards for each position?

Must be a Diplomat

THE LICENSING of airport managers at terminal airports and at other than private airports might prove an advantage to all concerned. The qualifications would vary as the responsibilities are different in many cases. Some airports operate their hangars, others lease them, or hangars are owned and operated by lease holders. The major factor in qualifications of this type is experience in airport operation. This cannot be obtained except by actually being on an airport staff.

No business that I know of requires as much in diversified talent and experience. Being able to see the operating end of an airport from all angles is highly desirable, also to forecast the results of traffic, weather, cold, rain and other factors as sudden thaws, excessive drainage in areas adjacent to an airport. Lighting and power failures all call for prompt efficient action. Knowing what to do and doing it effectively are points to be considered. An alternate plan or two of proven merit is required in many cases, also ability to operate with improvised equipment of various kinds.

He should be a diplomat, engineer, salesman, enforcement officer, aviation expert and airport expert and, as I have already stated, see the project from a broad view point, open to suggestions, regard safety of all concerned as paramount, and best of all be a product of the aviation industry. Experience at Commercial, Municipal and Governmental Airports is where this is obtained. Books help but are not a foundation.—HOWARD M. SHAFER, *Manager Rochester (N. Y.) Airport.*

Would Benefit Aviation

PERSONALLY, I have believed for a long time that such a plan not only would be feasible but would also redound to the benefit of aviation in general, and would especially facilitate transport and other scheduled operations and add to the safety factor in such operations.

I believe that the licensing provision should apply to managers of all airports where scheduled flying operations are conducted. Also, that the qualifications necessary to obtain such a license should be standardized by the Bureau of Air Commerce. I am confident that a standard classification could be evolved by the Bureau which would adequately cover the minimum requirements for the position, and I also believe that the Bureau of Air Commerce is the best equipped agency to determine the nature and extent of the requirements to be set up.

The application of a licensing system to airport managers would, I believe, assure adequate and experienced management for those airports of the nation which service the transport companies, and from which, incidentally, most other flying operations are conducted. It would also operate to the benefit of the public in eliminating the possibility of political appointment of inexperienced and perhaps unsatisfactory men to positions of such great importance to the aviation industry. In the final analysis the inauguration of such a program, I most sincerely believe would greatly promote the safety factor in operations and the efficiency of airport administration.—R. B. BARNITZ, *Director of Airports, Los Angeles, Calif.*

Should Move Slowly

LICENSING AIRPORT MANAGERS should be gone into very slowly inasmuch as different cities and different locations require different qualifications for the managers of their airports.

My own thought on the matter, based on seven years experience in the air mail service and eleven years as Manager at Chicago follows:

1. Reasonable education.
2. At least five years experience in all other branches of aviation.
3. Thorough knowledge of general administration.
4. A reasonable amount of knowledge in construction of buildings, runways, drainage, lighting and maintenance of the above.
5. At least 30 years of age.
6. Should be licensed airplane and engine mechanic.
7. Should be licensed transport pilot.

If the Department of Commerce is contemplating examining and licensing Airport Managers, I believe the thing should be handled entirely through the ideas and suggestions of present airport managers of large airports throughout the country.

In the case of the last qualification No. 7 we all know of one outstanding case whereby the airport manager is not a licensed pilot and has done a grand job of running the airport.—JOHN A. CASEY, *Manager, Chicago Municipal Airport.*

Qualifications Should be Set

I AM IN FAVOR OF the licensing of airport managers and feel that it should be applicable to all airports where a responsibility to the general public, both flying and on the ground is concerned. Certainly there should be, too, some standard qualifications set.—RICHARD ALDWORTH, *Superintendent, Newark Airport, Newark, N. J.*

Next Month's Question

QUESTION 27: What has been your experience in selling airplanes to prospects who carry substantial life insurance? Have you found the ratings put on private pilots productive of sales resistance? What methods have you used to overcome the difficulties resulting from this condition?

News of the Month

Highlighting recent events in the aviation world

Tale of Two Oceans

Fliers of four nations push drive to ruin our splendid isolation

ANY ONE SO CYNICAL as still to believe the North Atlantic too much of an assignment for air transport had only to visit Pan American's service base at Port Washington, Long Island on the week of Aug. 15 to come away talking about the danger of trans-oceanic traffic jams. Sunday the Bermuda Clipper flew in on schedule with a full load of passengers. Monday morning early Deutsche Lufthansa's Nordmeer (See page 40) droned in from the Azores where it had been catapulted from the Schwabenland lying off Horta. Few hours later the Pan American Clipper drove across Manhasset Bay in a take off for Southampton via Bermuda, the Azores, and Lisbon. Tuesday afternoon Imperial Airway's Caledonia came in from England after landings at Newfoundland and Montreal. Wednesday Imperial Airway's Cavalier roared in from Bermuda. Thursday the Bermuda Clipper took off for Hamilton—and so on. Pan American's maintenance and operations crews worked on day and night schedules. Reporters and photographers moved in for days at a time. Nearby residents, with the drone of four engined aircraft pounding their ear drums began worrying about real estate values. Not counting the routine flights to Bermuda and return the score for North Atlantic crossings since July 5 was scheduled to stand by the end of August at: Pan American Clipper 6, Caledonia 4; Cambria 2; Nordmeer 2.

Affairs to the North were not so sanguine. After two brilliant trans-polar crossings in single-engined ANT-25's, the Soviet launched a third plane for Moscow Aug. 12.

Much more elaborate than the previous projects the third expedition was to be a direct demonstration of the feasibility of transport operations. The plane, a big H-209 piloted by Sigismund Levanevsky was equipped with four 34RN engines and fitted for high altitude operations. Aboard in addition to a crew of five was a substantial payload of furs, caviar and mail. For weeks Soviet agents had been located at Fairbanks, Alaska, arranging for weather reports and fuel.

All went well until some hours after the ship had crossed the Pole, then somewhere in the "magnetic jungle" the ship's radio signals faded. Hours passed. Long after the ship must have landed faint radio signals picked up on the ship's wave band indicated a forced landing "somewhere in the Arctic." Planes from Alaska, Canada and Russia rushed preparations for a search, the American effort being headed by Jimmie Mattern, whom Levanevsky once rescued in Siberia and Joe Crosson, manager of Pacific Alaska Airways.

No matter what the outcome, trans-polar flying seemed ended until next

AMONG RECENT VISITORS—to Port Washington, Long Island. Top: The crew of the Nordmeer—Captain Joachim Blackenburg; Second Pilot Count Siegfried Schack; Flight Engineer Otto Gruschwitz; Radio Officer Wilhelm Kueppers. Below, The crew of the Cambria—Radio Officer Philip Woods; Captain Griffiths Powell; First Officer Colin Elder.

year when Mattern has secured Bureau of Air Commerce permission to participate with at least one American crossing

Trippe Takes Trophy

Collier award to an American For Pacific Venture

THE 26-YEAR-OLD COLLIER TROPHY, awarded annually for "the greatest achievement in aviation in America," the value of which has been thoroughly demonstrated in use or in practice during the preceding year," was awarded early in August to the Pan American Airways System for its organization and operation of the Trans-Pacific service Juan Trippe, president of the System, received the Trophy from President Roosevelt, in the usual White House ceremony attended by previous winners of the Trophy, officials and members of the National Aeronautic Association committee which made the selection of the winner.

Although there were many throughout the industry who thought that the Glenn L. Martin company deserved at least honorable mention for the development of the clippers which make the trans-Pacific operation possible, the award met with wide approval In the long period of deliberate preparations in its "Caribbean laboratory" Pan American developed methods of navigation, radio guides, a crew set-up and a training program which made successful transoceanic operations almost a foregone conclusion once ships and bases were ready In the words of Collier's article announcing the award, the whole project was typical of Pan American's development 'in which science, diplomacy, imagination and romance co-operate to tie the world together"

For Foreign Duty

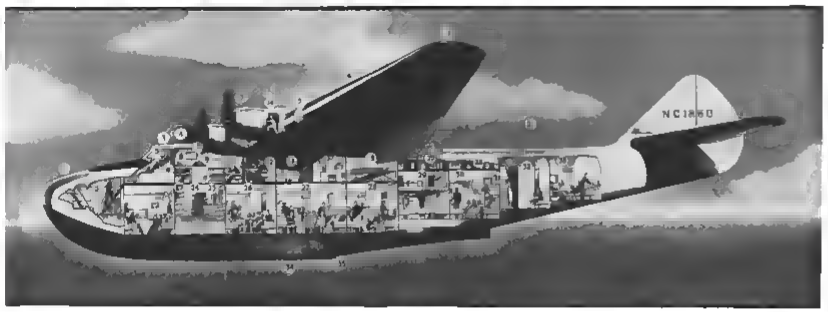
American Export Air Lines plans Atlantic routes

THE AMERICAN EXPORT STEAMSHIP COMPANY which for twenty years has been operating steamers to Mediterranean and Black Sea ports has organized a subsidiary, American Export Air Lines, which has applied to the Bureau of Air Commerce for permission to make survey flights looking toward the establishment of a trans Atlantic air service to serve the same regions Operating rights are being sought for routes to Bermuda the Azores, Lisbon, Spain and Northern Africa Equipment presumably would be Martin and Sikorsky flying boats similar to or larger than Pan American's present clippers. W H Coverdale is president, James Eaton vice-president. Coverdale is president of the parent company

No New Line Law

Senate shelves McCarran-Lea Bill in final rush

AS WE GO TO PRESS a weary Congress is packing its personal belongings awaiting an adjournment "tomorrow" Littered about the floors of both houses is an ankle deep pile of legislative bills dead from being innocent bystanders at the knock down drag out Court Bill fight. Among them lie the entire kit and kaboodle of legislative measures introduced this summer to modify the set-up under which our air lines are administered. Nearest to passing of any of them came the McCarren-Lea Bill designed to transfer the air lines from the guidance of the Post Office to that of the I C C Wednesday, Aug 18, it actually came onto the Senate floor first in order of unfinished business Passage seemed highly probable when our old friend Senator McKellar, chairman of the Senate's Post Office Committee raced back in the obvious beginnings of a filibuster Filibusters being the one thing the Senate was not at that time looking for, the bill was quickly shelved None of the other bills even came that close Fortunately no one behind the bill, and that includes practically the entire industry, feels much discouraged. The bill seems almost certain to pass early in the next session



BOEING'S BIGGEST

Cross sectional drawing showing the interior arrangements of the six huge clippers Boeing is building for Pan American Airways. [1] Anchor Hatch. (2) Seamen's Compartment. (3) Bridge [4] First Pilot. [5] Second Pilot. [6] Radio Direction Finder. [7] Navigation Compartment. [8] Radio Officer's Seat. [9] Chart Room. (10) Map Case Marine Library, Drift-Sight Bombs, Flares and Navigational Instruments. [12] Engineering Officer. [12] Captain's Office. [13] 1500 H. P Wright "Cyclone" engines, Hamilton constant speed propellers. [14] Mechanic's Wing Station. [15] Controllable Landing Lights. (16) Wing Spread 152'. [17) Navigation Lights. (18) Main Cargo [extends into wing] [19] Crew's Sleeping Quarters. [20) Luggage Holds. (21) Overall Length of Ship 103 feet [Height 23' 8"]. (22) 10-Passenger Compartment. [23) Spiral Staircase to bridge. (24] Mess Room. (25) Galley. [26) 10-Passenger Compartment. (27) Dining Lounge [accomodates 15) [28) [29) [30) 10-Passenger Compartments. (31) Ladies' Dressing Room. [32) Passenger Compartment. [33) Private Cabin Suite (34] Fuel pumps. (35) Auxiliary Hold.

Airline Developments

"Not excessive"—The Air Mail Act of 1934 specifies "If on any route only one bid is received, or if the bids received appear to the Postmaster Genreal to be excessive, he shall either reject them or submit them to the Interstate Commerce Commission." Late in July after solemn consideration, the ICC approved TWA's uncontested bid of 1 mill per mile for the route from Winslow to San Francisco as 'not excessive." The boards thus cleared, Post Master General Farley announced the award of that route and of the route from Dayton to Chicago to TWA, the route from Washington to Buffalo to Pennsylvania-Central, the route from Huron South Dakota, to Cheyenne to Wyoming Air Service Significant line at the end of ICC Air Mail Docket No 26! "Our action here should not be interpreted as approving bids which are merely nominal."

Pullman Privileges—Last month United Air Lines opened three mainliner sleeper services on its coast to coast routes. It also announced it had ordered 10 more Douglas DC-3 air liners, enough to bring its DC-3 fleet up to 40 Even more importantly it joined with Western Air Express in petitioning the Post Office Department for permission to lease its sleeper planes to W A E. on through services to Los Angeles whenever junction at Salt Lake City and schedules made such action desirable. Such a move President Patterson pointed out would enable WAE to effect an immediate saving of the cost of a new plane and was no more than the railroads had been doing through their Pullman and freight car set ups for decades. Eddie Rickenbacker, general manager of Eastern Air Lines asked for comment on the move, said, "If this is approved it will be one of the most far-reaching and important developments in air transport It will result in well nigh revolutionary changes in inter-airline operations It will enable us to render much more efficient service and cut operating costs tremendously It means we don't have to wait 50 years to do what the railroads finally did"

W.A.E. doubles—A merger which doubles the mileage of Western Air Express Corporation was made public late in July in a joint statement by Alvin Adams, W A E. president and Alfred Frank, president of National Parks Airways, to the effect that, effective Aug 1, W A E would take over the equipment and business of the other company The Post Office and the stockholders of both companies had approved the consolidation. The merger gave W.A.E. continuous route mileage from San Diego and Los Angeles to Great Falls, Mont

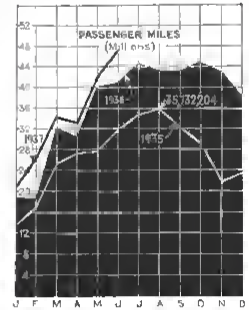
Tragedy over the Caribbean—At 7 37 P M, Aug 2, pilot Stephen Dunn flying a Pan American-Grace Sikorsky S-43 on a run from Guayaquil Ecuador to Cristobal, C Z reported by radio to the latter station that he was spiralling down through a heavy tropical rain storm for a landing on the Carribean side of the Canal No further word was ever received from any aboard the airliner, although next day Naval patrol planes and a submarine despatched to search the area came across sufficient wreckage to establish that the plane had been completely destroyed upon striking the water Testimony at the subsequent inquiry yielded little that could be used for a definite explanation of the accident. Most interesting was the statement by H R Harris, vice-president in charge of Pan American-Grace operations, that due to a mail transfer delay which resulted in a shortage of available pilots, Pilot Dunn had been forced to make a complete round trip between Cristobal and Guayaquil in the interval from dawn to the time of the accident Killed Pilot Dunn, Co-Pilot Lawrence Bickford Steward Hernan Diez, and eleven passengers including Rex Martin, aeronautics adviser to the Bureau of Air Commerce, and G Q Caldwell, air line inspector for the same Bureau

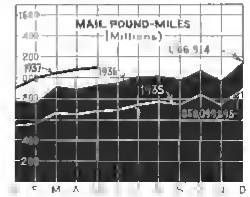
Canada tryout—With the Hon W. D Howe. Canadian Minister of Transport, as passenger, the first trans-Canada flight of the newly-organized Trans-Canada Airways was completed in July, the trip from Montreal to Vancouver consuming 17 flying hours. Regular trans-continental schedules will be set up this fall with the arrival of a fleet of six Lockheed transports

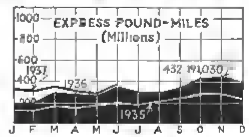
Skysleepers draw traffic—TWA traffic was up 13 per cent in passenger miles flown during July compared with June of this year according to a recent an-

Traffic

Latest available statistics from the Bureau of Air Commerce and the Post Office Department—Domestic airlines only







AIR TRANSPORT INDICATOR

August 1, 1937

110.2

—which is the ratio of revenue passenger miles for July 1937 as compared with the corresponding figure for July, 1936.

For June 1937 the indicator stood at 113.2

NORTHWEST'S FIRST LOCKHEED 14

—set for its first flight tests at the factory. With an estimated speed at 6,700 ft. of 264 m.p.h. and a cruising speed of 241 m.p.h. at 13,600 ft. Northwest plans to use it and seven sister ships to cut running time in Chicago from Seattle to ten hours. Powered with P&W SEG Hornets it will be used by Northwest as a ten passenger ship although licensed for 14.

nouncement. Coupled with this were an increase of 3 per cent in mail poundage and of 20 per cent in express pound-miles flown in the first seven months of 1937 compared with the same period of 1936. Looking ahead to the inauguration of service over its new routes Winslow-San Francisco and Dayton-Chicago in September, TWA expects substantial further gains in all traffic departments. Meanwhile as deliveries of new equipment have made possible the placing of skysleeper Douglases on all but one of its night schedules, TWA announces the elimination of extra fare charges on all skysleepers and sky-club planes, charges which have amounted to about three per cent of the total fare. The extra charge for berths, similar to charges on other lines is, however, retained.

Eastern a first—At 4:40 A.M., August 10, an Eastern Air Lines Douglas DC2, Captain Stuart Dietz, took off from the airport at Daytona, Florida, on what was to have been a flight to Miami. Just at the edge of the field the ship struck a high tension pole, tripped, crashed. Killed: Captain Dietz, Co-pilot Robert Reed, and two passengers. It was Eastern's first accident with passenger fatalities in eight years of operations and over 50,000,000 passenger miles. Testimony at the inquiry revealed a power company had erected the pole during that very night, but had neither marked it with a light nor informed airline personnel of its presence.

American reports—All its records for revenue passengers carried and revenue passenger miles flown in a single month were broken by American Air Lines during July. In the thirty-one day period, American carried 33,333 paid passengers on its nation-wide system, and flew a total of 3,078,082 passenger miles, which record compares with the 33,902 passengers carried and the 2,541,135 passenger miles flown in June, previous high marks. The breaking of records during July extended to all but two of American's eight routes. For the first six months of 1937 American carried 31.7% of the total of 464,068 passengers traveling on the domestic network.

More schedules south—For the first time three convenient daily schedules each way between Chicago and New Orleans will be operated on and after September 1 by Chicago and Southern Air Lines. The new schedule, to be known as "The Rainbow", will be inaugurated as an afternoon flight added to the present morning and evening schedules. It is to be operated with Lockheed Electra airplanes and will cover the distance between Chicago and New Orleans in slightly more than six hours.

Clipper progress—Production of the six Model 314 Boeing Flying Boats being built for Pan American Airways is well advanced, with two of the boats in final stages of assembly. The first plane is scheduled to fly before the end of this year. All six are expected to be ready for duty on Atlantic and Pacific routes during 1938. A cross-sectional drawing will be found on page 64.

Students Cram Schools

California's instruction facilities expand for record enrollments.

AS THE SUMMER PROGRESSES a remarkable concentration and growth of air school activities on the West Coast becomes apparent. Record high enrollments are reported by the Boeing School of Aeronautics in Oakland, and the Ryan School of Aeronautics in San Diego, but the major activities are reported from Los Angeles County, where factory payrolls now total more than 12,000 persons and employment continues at a high rate. At Curtiss-Wright Technical Institute of Aeronautics on Grand Central Air Terminal welding and sheet metal courses have increased so in popularity that new facilities have had to be provided. A recent and unusual school adjunct is a full scale swimming pool dedicated exclusively to the use of Curtiss-Wright students.

Located approximately a mile from Grand Central Air Terminal is the big new Aero Industries Technical Institute sponsored by such industry leaders as Robert E. Gross, John K. Northrop and C. A. VanDusen. Doors of this school open Sept. 7 for practical instruction in manufacturing methods. Early enrollments indicate the school will open to its current capacity of 250. In downtown Los Angeles the Warren School of Aeronautics has installed elaborate new welding shop equipment for simultaneous instruction of two dozen men and has purchased $10,000 worth of machinery for an aircraft machinists course. This is an innovation in aircraft trade school instruction and has already proved so popular that Warren has scheduled both day and night classes in all types of aircraft machine work.

Not far from the Warren School is the new Aeronautical Institute of Technology, formerly known as the Aeronautical Institute of Los Angeles. The school is operated by Theodore A. Woolsey, its founder. In its new quarters the Aeronautical Institute of Technology is offering complete courses in engineering and shop practise, including welding, sheet metal forming, and machine work. Day and night courses are provided, together with preparatory extension work by mail.

At Los Angeles Airport the California Flyers' school of flying, has expanded its scope to include instruction in aircraft welding, riveting, sheet metal forming, layout and drafting and aircraft mechanics. The school has taken over all of Hangar No. 4 and is currently enjoying a record enrollment under the instruction of a three-man faculty consisting of Norman E. Sherman, Banks W. Smith, and W. A. Hammond, all of whom are particularly qualified.

In Hangar No. 3 on Los Angeles Airport the Aero Activities Technical Institute has been founded by Kenneth C. Hawkins with H. Glenn Warren serving as Dean, and Stanley H. Evans in charge of Engineering School instruction. All of these men have wide experience in aviation school work, Hawkins having organized and operated a number of Navy schools, Warren having served as head of the aeronautics department for both the California Polytechnic School and the Pasadena Junior College, and Evans having organized the engineering school of the Curtiss-Wright Institute of Aeronautics. Courses offered include flying, shop work and engineering instruction. The school is organized as a non-profit corporation.

A unique new school project is the Fletcher Aircraft School, of which W. S. Fletcher is president, F. P. Fletcher, general manager, and J. S. Leavell superintendent. With headquarters in Santa Monica, near Clover Field and the Douglas Aircraft Co. this school operates branches in Long Beach and Pomona. Founded in 1936, the school moved to its present large quarters in May of this year. All instruction is concentrated on a 4-6 weeks shop course preparatory to actual aircraft factory employment. With current enrollment totalling approximately 200 men, the school has already trained and placed a total of 800 men.

Despite so much concentration on preparation for factory employment, the flying schools are prospering. Marion McKeen Aeronautics, offering only flying instruction and featuring advanced work, is operating from three to five hours per day per plane and is installing new flying equipment and instructors to meet current demand. Much the same situation holds for Grand Central Flying School, operated by Joe Plosser and Paul Mantz and Joe Lewis Flying Service on Union Air Terminal.

Naval Affairs

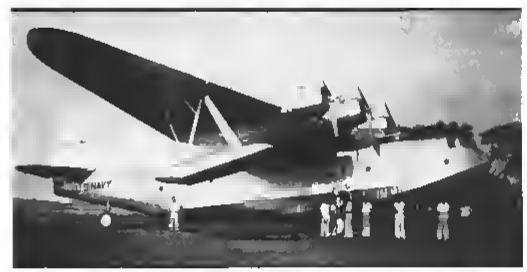
Profitless— Rear Admiral Arthur B. Cook, Chief of the Naval Bureau of Aeronautics, told a House Naval Affairs Sub committee on August 5 that because of the 10% profits limitation on naval contracts, fewer manufacturers were submitting designs in competition for experimental aircraft. Appearing as the first witness at a hearing on a bill which would exempt aircraft manufacturers from such limitations, Admiral Cook stated that between 1927 and 1933 the average profit on production contracts for naval aircraft was 8.0%, the average loss on experimental contracts 34%. Between 1934 and 1936 average profit on production orders fell to 2.8%, the average loss on experimental work rising to 71%.

Kodiak Patrol— Early in August a fleet of twenty-four Consolidated PB Y patrol boats completed one of the most ambitious mass patrol problems in the history of naval aeronautics. Returning to San Diego Aug. 10, the Consolidated Boats successfully completed formation flights to Seattle and from there to Sitka and Kodiak, Alaska, and return. Encountering adverse weather conditions and operating far from established bases, the maneuvers were completed without a single mishap of consequence.

Sarah & Lex— Hearings have opened in the Naval Affairs Committee on a House bill providing for modernization of the aircraft carriers Lexington and Saratoga. Recompartmentization and other changes to prevent accident by flooding, and replacement of considerable machinery are contemplated. The cost would be about $14,000,000. Allotments for this purpose have been approved by the Budget Bureau. It is estimated replacement of the ships by new construction would cost $70,000,000.

Amphibian contracts— The Bureau of Aeronautics has announced the placing of contracts for nineteen amphibians. Fifteen will be single engined Grumman utilities, built by the Grumman Aircraft Engineering Corporation of Bethpage, Long Island. Four are to be twin-engined Sikorskys, similar to the commercial S-43 design. Total contract price for the Grummans was $554,300, for the Sikorskys $827,839.

Cadets arrive— Seventy-four aviation cadets reported July 26 at the Naval Air Station, Pensacola, Florida for flight training. All these cadets, who form the first class for the fiscal year 1937-1938, had received preliminary flight training at Naval Reserve Aviation Bases. Five other classes, a total of 450 cadets, will assemble at Pensacola during the year. Three hundred and fifteen are expected to complete the course.



FLYING DREADNAUGHT

Sikorsky's huge $5,000 pound patrol plane for the Navy which began manufacturer's flight tests in mid-August. Equipped with four P&W 1830 twin-row Wasps the XPBS-1, on the new flying boat is designated, will carry "a military load comparable with that of any known existing airplane over a range equal to that of any Navy patrol plane. Sound-proofing, bunks a complete galley are provided.

MARTINS TO ARGENTINA

Thirty-five of these Martin bombers to cost $4 300 000 were ordered by Argentina. Lieut. Ellis Shannon (left) flew this one 7,000 miles to Buenos Aires for the competition. With him went (left to right) Frank White, mechanic; Howard Thompson, radio operator, and Dean Brauer, engine mechanic.

Air Corps News

13 more from Boeing— In a routine 2100-mile non-stop cruise, the thirteenth Boeing YB-17 four-engined bomber was delivered to the Air Corps at Wright Field, Dayton, Aug 4 The big ship's arrival marked the completion eleven weeks ahead of schedule of the Boeing Company's initial YB 17 bomber contract awarded Dec. 18 1935

Boeing is meanwhile preparing to begin production of a second series of thirteen four engined bombers contracted for last month, which will be designated B-17B's As finally written, the second contract is for thirteen planes plus the equivalent of two more in spare parts The contract price was $3,708,002 The first of the new series is scheduled for delivery in eleven months two planes per month to be delivered thereafter The B-17B's will be identical to the YB-17's except for minor military changes and will carry the same power plants —four 1,000 hp Wright G Cyclones

No Mitchell Race— August 9 an Air Corps announcement from Selfridge Field, Michigan had it that the annual contest for the Mitchell Trophy, scheduled for September 18, would this year be a humdinger—the Boeing P-26's which have been used in recent races would be replaced by Seversky P-35's, generally understood to be faster than 300 mph Three days later another announcement cancelled all that September 18 there won't be any Seversky's racing In fact there won't be any Mitchell Trophy race this year Circumstances have made it advisable' was the only explanation accompanying the cancellation

5 for Denver School— A House bill appropriating $2 275 000 for construction of an extension to the Air Corps Technical School at Denver was passed July 19 and was expected to pass the Senate before adjournment Purchase of land totaling 960 acres including an estate known as the "Agnes (Phipps) Memorial Sanitarium" at Denver and also a tract within Colorado to be used for aerial gunnery and bombing, is contemplated The appropriation is allocated as follows

Barracks	$935 000
Hospital and administration buildings	200 000
School building	540,000
Runways	300,000
Grading and improving landing field	300 000

Bureau Blames Static

Hindenburg findings clear little uncertainty from airship picture

TEN WEEKS after the disaster and following elaborate testimony by a longer list of competent yet unagreed eye-witnesses than were ever before available at an aeronautical inquest the Bureau of Air commerce issued in a long report its findings on the destruction of the Hindenburg; 'The cause of the accident was the ignition of a mixture of free hydrogen and air Based upon the evidence, a leak at or in the vicinity of cells 4 and 5 caused a combustible mixture of hydrogen and air to form in the upper stern part of the ship in considerable quantity, the first appearance of an open flame was on the top of the ship and a relatively short distance forward of the upper vertical fin. The theory that a brush discharge (of static electricity) ignited such mixture seems most probable"

It was a finding as nearly definite as could possibly have been expected The "probable cause" gibed with the personal theories of Dr Eckener and did not conflict with the German committee's report which listed eight possible causes, one of them static none of them sabotage Meanwhile on other fronts the future of lighter-than-air continued an open question With favorable action assured from the American congress on proposals to permit the export of helium for commercial purposes Zeppelin engineers have completed the re-design of the LZ-130, now scheduled for launching in the spring of 1938 In Washington, however Admiral William D Leahy went before a House committee considering a naval airship bill and testified "unofficially" that his department at this time could not recommend further expenditures for building and operating rigid airships for military purposes. The Navy, Admiral Leahy said, had in the past found that such ships were 'wanting'

On the commercial side airship proponents found encouragement in the fact that they seemed at last assured of legal recognition in pending legislation as proper recipients of trans-oceanic air-mail contracts, but were disappointed at scales of pay so far considered for such airship operations In the non-rigid field the Air Corps continued its process of deflation of all lighter-than-air activities, save those connected with observation balloons. The Navy, in contrast, placed contracts last month for two new ships

Industry Hits Stride

One A Show for 1938—The Aeronautical Chamber of Commerce has announced it will sponsor a single big air show next year—one to be held in Chicago from Jan 28 to Feb 28 To be operated under the management of the International Air Show, Inc., the exhibition is to be held in the International Amphitheater, and has been backed by a number of prominent Chicago business men. The Chamber's show committee has granted a Class A sanction

Interstate — Occupation of its new $350,000 plant adjoining Los Angeles Airport was completed by Interstate Aircraft and Engineering Corporation early in August. At present working almost exclusively on machine work for Douglas the Interstate Corporation is working three shifts a day with more than one hundred and twenty employees Present floor space totals 40,000 square feet and the factory site contains six acres of ground to provide for future expansion Corporation officers: Harry Reynolds, president; D E McDaneld, vice president; Pat Brady, Secretary and George O Noville, in charge of advertising

Stearman-Hammond delivers— Commercial deliveries of the Stearman-Hammond Model "Y" are now being made, the first plane going to Lawrence C. Ames First dealer delivery went to Jim Webster, Inc., Burbank, Calif First foreign delivery was to K L M, which has been granted exclusive European sales rights First military deliveries were two planes to the U. S Navy

Business for Beech— Recent orders reported by Beech Aircraft two Beechcraft equipped with 450 hp Wright Whirlwinds for use as ambulances by the Military Council of the National Chinese Government An E17B equipped with 285 hp Jacobs to J R B Moore, Laredo, Texas oilman, and another to Major Hugh Watson of Sharonville, Ohio An E17L, 225 hp Jacobs to Samuel Bosch, 'flying doctor' of Buenos Aires, Argentina A SE17B equipped with seaplane floats to Aircraft Industries of Canada

Martin boosts labor— The Glenn L. Martin Company has announced a 'unilateral agreement' with its employees which provides for a minimum wage of 40 cents an hour, a forty-hour, five-day week, and vacations with pay for those qualified. The agreement also contains recognition of "the right of every employee to join or refrain from joining any organization or union without discrimination by the company" in either eventuality

Northrop Votes— An election to determine whether employees of the Northrop Corporation wish to be represented by the United Automobile Workers local 229 a C I O union, or by the independent Aircraft Workers Union local No 1, was ordered August 6th by the National Labor Relations Board The election was to be held within twenty days.

Arrowbiles in production— Seven 1938 model Waterman Arrowbiles are now under construction at the Waterman Arrowplane plant in Santa Monica, California, which are scheduled for delivery October first. Five are for the Studebaker Corporation in South Bend, one each for Charles B Knox, prominent Honolulu sportsman-pilot, and for David R. Fleet of the Consolidated Aircraft Corporation of San Diego Operating on a basis of approximately 2,000 man hours per week, the Waterman plant is now employing 35 skilled aircraft mechanics.

First half year— Lockheed's backlog of unfilled business reached $3 370,000 in the month of July, according to Robert E Gross, president For the first six months of 1937 the company delivered forty-seven twin-engine transports, compared with fourteen during the same period last year Sales for the first half year totalled approximately $2,500 000 The large volume of business handled this year has been completed without the aid of bank loans Lockheed plant facilities have been doubled during the first half of this year and plane deliveries during the second half are expected again to exceed any previous such period

Sales up 53 per cent

Rogers gives Chamber figures

AN INCREASE of 53% in sales of American aircraft, aircraft engines and spare parts, was shown in the first six months of this year in comparison with the same period for 1936, according to figures made public last month by Leighton W. Rogers, president of the Aeronautical Chamber of Commerce

Total sales for the six-month period were $49,450,114, in comparison with $32,218,341 for the corresponding period of 1936 Sales of commercial planes showed the largest increase, totaling $9 989,085, which was 81% above the value of planes sold in the same time last year Deliveries included 953 two three and four-seater private planes, ninety-seven transport planes, three sea planes, and eight amphibians

Military plane deliveries increased 49% consisting of 264 planes with a total value of $12,462,564 Total commercial engine deliveries had a value of $7,797,038, an increase of 85%, and consisted of 2,083 units Sales of military engines showed a slight decrease in value, falling from $7,258,079 to $7,075 309 In the six-month period, 936 new units were delivered in comparison with 827 to July 1, 1936.

SCOUT BOMBER

First production model of the SB2U-1 delivered last month to the Navy by the Chance Vought division of United Aircraft. Powered with a 14-cylinder P&W Twin Wasp Jr. it is said to have a substantially higher performance than existing service types. Fifty three more are scheduled for delivery before the end of the year.

Financial Reports

Reflect widespread progress toward a record year

» Air Associates for nine months ending June 30, 1937—a profit before provision for federal taxes of $75,570 compared with $46,203 for the same period a year previously. Net sales were up to $1,045,293 from a corresponding $701,871.

» Aviation Corporation and subsidiaries for six months ending May 31, 1937—a net loss of $143,156 after all charges, including development costs of $168,813. For six months ending June 30, 1936 the corresponding figure was a net loss of $174,270.

» Bendix Aviation Corporation for the period ending June 30, 1937—consolidated net income $1,631,961 or 78 cents a share, compared with $1,869,560 equivalent to 89 cents per share in the corresponding 1936 period.

» Curtiss-Wright Corporation for quarter ended June 30—a net profit of $631,346 after depreciation and provision for normal taxes. This compares with a net income figure of $269,251 in the preceding quarter and of $553,341 reported for the June quarter of 1936. For the six months ending June 30 total net profit was $900,597 compared with $821,820 earned in the corresponding period of the previous year.

» Douglas Aircraft Company and its subsidiary, the Northrop Corporation, for six months ending June 30, 1937—a net profit of $525,822, equivalent to 92 cents a share. Deliveries for the period totalled $8,501,760 with estimates for 1937 deliveries running to $18,000,000. Backlog June 30, of the two companies which employ 8,000 persons stood at $36,600,000.

» Fairchild Aviation Corporation and Subsidiaries for the calendar year 1936—Net income after normal taxes and surtax on undistributed earnings, $78,982 equivalent to 23 cents per share. This contrasts with a net loss for 1935 of $98,869. Unfilled orders Dec. 31, 1936 amounted to $1,000,537 against $460,250 a year previously. Unfilled orders April 30 of this year $1,053,463.

» Lockheed Aircraft Corporation for six months ending June 30, 1937—a net profit of $281,562 equal to 43 cents a share comparing with a net profit of $40,213 (8 cents a share) for the first half of last year. Sales for this year, first half, totalled $2,644,991 against 1936 sales in the first half of $660,974. Total sales for all of last year were in fact $2,006,500, a smaller figure than for this years first six months.

» The Glenn L. Martin Company for the three months ending June 30, 1937—a net profit of $186,838 after depreciation and normal tax provisions. Total net profit for first two 1937 quarters: $526,307, equivalent to 61 cents per share. Backlog of unfilled orders June 30: $11,406,663.

» North American Aviation, Inc. for the six months ending June 30, 1937—a net profit of $65,564, after normal taxes and depreciation ($341,281) but before including a profit of $1,268 from the sale of securities. Comparable net profit figure for 1936: $86,027. Unfilled orders of the Engineering and Manufacturing Division June 30 this year: $8,068,322. Last year: $1,190,390.

» Solar Aircraft Company (successors to Solar Aircraft Co., Ltd.) for the period from the beginning of operations Aug. 12, 1937 to the end of the Company's fiscal year, April 30, 1937—Net sales: $197,836. Net income after provision for taxes: $13,107, equivalent to 10.1 cents per share. Backlog of unfilled orders April 30: $134,892.

» United Aircraft Corporation for the quarter ending June 30, 1937—a net profit of $989,203 after provision for depreciation and normal taxes. Total corresponding profit for the first six months of this year: $1,688,055, equivalent to 67 cents per share. Corresponding profit figures for 1936 second quarter: $197,607, first six months: $548,559, representing 24 cents per share.

» United Air Lines for three months ending June 30—a net loss of $59,849 compared with a net loss of $402,735 for the first quarter of this year, and a net profit of $222,625 for the second quarter of 1936.

» Waco Aircraft Company for the three months ending March 31, 1937—a net loss of $38,718. For the same period last year Waco's net loss amounted to $44,918.

» Wright Aeronautical Corporation for the quarter ending June 30, 1937—a net profit of $750,240 or $1.25 a share against a net profit of $286,353 or 48 cents per share in the preceding quarter and $343,570 or 57 cents a share in the June quarter a year ago.

RYAN AERONAUTICAL COMPANY

—and its wholly owned subsidiary Ryan School of Aeronautics reports for the six months ending June 30, 1937 a net profit of $23,553 equal to 9.2 cents per share. Deliveries for the period were 200 per cent ahead of the first half of 1936. Backlog including orders for 26 ST Ryans, totalled $240,000. Above: A recent line-up of ST's at the San Diego factory.

Aviation People

Who's who and what they are doing

REX MARTIN

JOHN L. MADDUX

PAUL S. BAUER

CROIL HUNTER

» Tragedy twice touched the Bureau of Air Commerce in the loss of REX MARTIN and GARNETT Q CALDWELL, passengers on the Pan American-Grace line's clipper "Santa Maria", wrecked off Panama on August 3 Although Mr Martin had served with the Army Air Service during the World War, his professional career in aviation began in 1928 when he became president of Aviation Sales and Service, an organization handling airplanes and accessories He was also president of the Junior Air Service of America, formed to give standardized ground instruction through flying schools. Coming to Washington in 1931 as secretary to Senator Kent E Keller, he was appointed Assistant Director in charge of Air Navigation for the Bureau in 1933 In March of this year he was appointed the Bureau's Aeronautical Adviser for Latin America, and it was in this connection that he was aboard the "Santa Maria." In 1934 Mr Martin served as American delegate to the International Aeronautical Exposition held in Paris, and in 1935 he flew to Buenos Aires as aviation adviser to the American delegation to the Pan American Commercial Conference He was among those decorated by the Italian government for assistance rendered in General Balbo's flight to Chicago in 1934.

Garnett Q Caldwell was appointed Air Line Maintenance Inspector for the Bureau in 1934 and in February, 1935, was made Air Line Inspector For six years prior to his coming with the Bureau he had piloted for several operators, and had been chief pilot for American Airways from 1931 to 1934 His presence on the "Santa Maria" was also in line of duty, as he was returning from an inspection tour of United States air operations in South America

» The death of JOHN L MADDUX in New York on July 26 recalled to New Yorkers the tri-motored Ford plane exhibited at Pennsylvania Station some seven or eight years earlier, which for many was their first close-up of a transport plane It was this plane that constituted the original equipment of Maddux Air Lines when organized by Mr Maddux ten years ago One of the first air transport companies to operate on regular schedule in California, the line grew and in 1929 merged with Transcontinental Air Transport, under the name of TAT-Maddux Air Lines. Mr Maddux was president and COLONEL LINDBERGH chief technical adviser When, in 1930, the Post Office asked for bids on a transcontinental trunk line, a combination was effected whereby TAT-Maddux Air Lines and Western Air Express became Transcontinental & Western Air, Inc., the successful bidders. Mr. Maddux served as vice-president until his retirement. He had also supervised the construction of the airports at Kansas City and Glendale. Until recently he was president of Maddux Electric Brake Company, and at his death was president of Maddux-Lincoln, Inc. Mr Maddux had just celebrated his forty-ninth birthday.

» At a special meeting of the Board of Directors of Northwest Airlines, CROIL HUNTER was elected president. Mr Hunter for the past four years has held the position of vice-president and general manager He replaces L. M LEFFINGWELL, resigned, who continues as a director Mr Hunter is vice-president of the Air Transport Association of America.

» A State Aviation Council of seven will plot the future of air transportation in Pennsylvania It will study flying problems, and will make recommendations concerning transportation, airports, airway facilities, aeronautical education and the control of flying The Commission, named by GOVERNOR EARLE, will have at its head SECRETARY OF REVENUE J GRIFFITH BOARDMAN Other members are W. WALLACE KELLETT, president of Kellett Autogiro Corp., J D. CONOON, former president of Central Airlines, LESTER P ARNOLD, executive assistant of Penn Central Airlines HARRY MAGEE, operator of a commercial airport; GEORGE BREW aviation manager of Lycoming Manufacturing Co., ALFORD WILLIAMS, aviation manager for Gulf Refining Co., and CAMILLE VINET, head of the division of aeronautics in the Department of Revenue.

» Like Pennsylvania, Massachusetts has recently created a Special Commission on Aviation and Planning, Development and Location of Airports Its function is to recommend to the legislature the policy of the Commonwealth with respect to development of aviation for the next twenty years or so Appointees by the Governor are CHAIRMAN PAUL S. BAUER, SECRETARY LAURENCE G HANSCOM, JAMES A. GUNN JOHN W. LASELL, JEREMIAH J HEALY Mr Bauer is an en-

thusiastic private pilot of long experience and a member of the American Mathematical Society, the American Physical Society, the Institute of Radio Engineers. For the past five years he has been treasurer of North Shore News Company and president of Pine Tree Airways Inc. He has been chairman of the Advisory Board of Aeronautics, Massachusetts, since its creation by the acts of 1935.

» THOMAS A. MORGAN, president of Sperry Corporation, announced that FRED J. FISHER of Detroit was elected a director of the company. He stated that Mr. Fisher had recently acquired a substantial amount of voting trust certificates of the Sperry Corporation in exchange for his stock in Vickers, Inc. All of the stock of Vickers, Inc., was acquired by the Sperry Corporation in March, 1937.

» EDWARD NEFF, formerly personnel director of Consolidated Aircraft Company, has been named director of Aeronautical Institute of Technology, (formerly known as the Aeronautical Institute of Los Angeles) according to announcement of THEODORE A. WOOLSEY, president. Other appointments include O. KENNETH WILSON as chief instructor and DEWEY L. MOODY, regional supervisor.

» Our seats of higher learning take cognizance of contributions by aviation's leaders! To GEORGE J. MEAD, vice-president and chief engineer of United Aircraft Corporation the degree of Doctor of Science from Kirby College, Hartford, to T. P. WRIGHT, vice president of Curtiss-Wright Corporation in charge of engineering, Doctor of Science from Knox College, Galesburg, Ill. Mr. Wright has also recently been elected a Fellow of the Royal Aeronautical Society of London. Also announced was the presentation of the degree of Doctor of Aeronautical Science to DICK MERRILL by Pennsylvania Military College, Chester, Pa.

» Down in the Lone Star State the name of E. LEONARD NELSON is well-known to air travelers. Nelson began airline work with the Southwest's first commercial transport system, Texas Air Transport, in 1929. Recently resigned as district sales manager in Texas for American Airlines, he has joined Braniff Airways, and will be in charge of its Fort Worth division.

» F. E. GRAY is president of Gray Radio Company, now engaged in aviation radio activities at West Palm Beach, Fla. Mr. Gray, pioneer and contributor of many designs in aviation radio, recently spent a year in China as consulting engineer in this field to the Chinese government. HARVEY M. DEVANE, who manages the company, has been connected with Boston-Maine Airways Inc. at Boston. Previously he had been with Pacific Alaska Airways (a Pan American subsidiary) at Fairbanks, Alaska.

» Success story of the month. In 1934 FRANK SCHARMACK joined Lockheed Aircraft Corporation and in less than two years had worked up to top position in the inspection department. In May of last year he was made chief inspector. On July 15 he was assigned to the duties of assistant production engineer, a new position created to insure better coordination between production and engineering divisions of the factory. Prior to his Lockheed connection Mr. Scharmack was for ten years assistant chief engineer for Moreland Motor Truck Company and was also on the engineering staff of Airplane Development Corporation.

» Succeeding FRANK SCHARMACK as chief inspector at Lockheed Aircraft Corporation is GEORGE PRUDDEN, formerly in the stress analysis division of the engineering department. Mr. Prudden taught at the University of Minnesota for a year, was with Stout Metal Airplane Company for five years, formed the Prudden-San Diego Airplane Company, and later was employed by Atlanta Aircraft Corporation and Keystone Aircraft Corporation. He came with Lockheed in 1932.

» FRED VELSMEIER, president of Rising Sun Aircraft School, Philadelphia, announced two additions to the teaching staff. WILLIAM P. MCCONNEL has been made chief of the airplane division. During the World War he served in the Aero Service and assisted in organizing the first big army field in this country, now Kelly Field.

E. LEONARD NELSON

LEYORK CHEESEMAN, graduate of the school and until recently connected with the Bellanca Aircraft factory, will assist in the engine department.

» WALTER R. JONES has recently resigned his position as chief engineer of Kellett Autogiro Corporation, to accept a similar position with United Air Lines Transport Corporation. Jones went with the Kellett company in 1935, after having been twelve years with Boeing Aircraft.

» One of the earliest researchers in duralumin, PROFESSOR ALFRED WILM, died in Germany on August 11, at the age of 68. He was a member of the engineering faculty of Goettingen University, where he followed in the footsteps of PROFESSOR F. WOEHLER, who had pioneered in the chemical isolation of aluminum.

» In Allied Industries Roller-Smith Company announces that H. D. SEATON, Chattanooga, has been appointed its special agent for Tennessee, and Ward Engineering Co., Jacksonville, for Florida. . . . W. H. SCHEER is Worthington Pump & Machinery Company's manager at the Holyoke plant. . . . THOMAS R. A. BEVAN has been elected a vice-president of Ethyl Export Corporation, foreign subsidiary of Ethyl Gasoline Corporation, continuing his post as manager of the London office which he has occupied for the past ten years. . . . FRANCIS R. BANKS has been named assistant secretary of Ethyl Export. . . . W. H. BLACKMER resigned as sales manager of Laminated Shim Company to accept the vice-presidency and general managership of Packless Metal Products Corporation. . . . R. P. SNAKER will be in charge of Lincoln Electric Company's new sales engineering office at Dayton. . . . OWEN C. JONES is now assistant to the president of Laminated Shim Company. . . . Electric Storage Battery Company has appointed W. C. LEINGANG as manager of Automotive Manufacturers' Sales. . . . C. W. GILMER, manager Mechanical Sales at United States Rubber Products' Seattle office, has been transferred to New York City as Belting Sales Engineer, and L. F. Koepp succeeds him at Seattle. . . . MARVIN MARSH manages American Rolling Mill Company's new district office in Kansas City.

» G. S. KLEVERSTROM, formerly of Ernst & Ernst, public accountants, has joined Air Associates, Inc. as Controller, and will be located at the head office at Roosevelt Field, L. I.

To Sock or Not to Sock

(Continued from page 33)

higher court sustained the lower court's conviction, explaining the legal meaning of the term "disorderly conduct," as follows:

"There are different ways that one can be disorderly. One may go into your place of business and get into an argument with some of you gentlemen, get mad, and you invite him out and he refuses to go, that would be disorderly conduct. A party can get to talking out loud and cause a disturbance and that would be considered disorderly, whereas, the legal definition of disorderly conduct is as follows: 'The term is usually held to embrace all such acts and conduct as are of a nature to corrupt the public morals or to outrage the sense of public decency, whether committed by words or acts.'"

Passenger vs. Passenger

An important point of the law is that if a passenger appeals to an operator for protection the operator is legally bound to use reasonable efforts to protect the passenger, and a failure to do so results in the company being liable. In one late case (166 So. 701), a passenger was cursed by another passenger. He appealed to the operator, who failed to protect the appealing passenger who was assaulted and beaten by the other passenger. The injured passenger sued the company for damages, and the higher court held the passenger entitled to a favorable verdict, saying:

"The plaintiff's (passenger's) evidence showed an assault and wrongful ejection in the presence of said servant (operator) and not the slightest effort on their part, by word or act to protect him, though appealed to for protection. . . . The defendant's (company's) servants may not have known of the intention of the assailants when boarding the car, yet it was their duty to protect the passenger at any time after they had notice that he would be attacked."

Deadheads Don't Count

A person is not legally a passenger unless he has a valid ticket or money to pay his fare. Therefore, a person who has no money can be refused entrance to, or be ejected from a plane without liability. And a person who has custody of a child may be ejected without liability if he refuses to pay the fare for the child. In a leading case (166 So. 50) a person with a child refused to pay fare for the child. The operator returned the person's ticket and requested the person in a low tone and in an orderly manner to leave. He did so and afterward sued the company for damages. During the trial the person testified that the operator did not touch him and that he was caused no humiliation or embarrassment. The higher court refused to hold the company liable saying:

"In exercising the right of expulsion, unnecessary force must not be used, nor must it be exercised at such time, place, and under such circumstances that serious injury will probably and naturally result . . . But the authorities hold that the carrier may, under some circumstances, be held to liability if the employe makes use of abusive, insulting, or threatening language . . . based upon the theory that the unnecessary use of such language constitutes an expulsion in an improper manner."

How to Avoid Liability

The higher courts hold that where a company official puts the management of anything or department in the hands of an employee, the company is responsible for the acts of the employe committed within the scope of employment, and in furtherance of the business. This law is applicable although the act was committed through lack of discretion or judgment, or loss of temper occasioned by the circumstances of the occasion. This rule of the law is founded on public policy and in no other way could there be any safety to third persons in their dealings, either directly with employers or indirectly.

Now, therefore, in order to avoid liability for the ejection of undesirable persons, and passengers, the officials of airports and air lines should be certain to instruct their employees who are authorized to make the ejections, as follows:

If a person disobeys our rules, or is for any good reason a nuisance, approach the person in an orderly and quiet manner and explain to him in a low tone why he is being requested to leave; if the patron refuses to leave, then a sufficient amount of force may be used to eject him, remembering that no liability exists unless undue and unnecessary force is used to eject him, while the person is being ejected he should not be cursed or otherwise abused; if while he is being ejected he plainly states that he will leave in an orderly manner, give him a chance to do so.

Air Navigation

(Continued from page 39)

portion of the chart to use. When a definite landmark is identified, the time and distance from a previous known point is used to give the ground speed and track which has been followed. This assumes that the pilot steers a steady course at a constant air speed. The Dead Reckoning record becomes useless when the course and speed are varied and no record kept of the changes. In practice the finished navigator will keep a careful record of his Dead Reckoning and will then utilize every opportunity to check the Dead Reckoning positions by *pilotage*, *radio* and *celestial navigation*.

Skilled navigators, such as Harold Gatty or Colonel Lindbergh, can navigate a plane by Dead Reckoning for several hundred miles with an accuracy to within a degree of the correct course and to within two to four per cent of the correct ground speed, and often better than that. Here it might be well to give the other side of the picture and point out that some careless navigators sometimes get hopelessly lost on a flight of less than a hundred miles. Altogether, navigation is a science which richly rewards skill and intelligence and in like measure punishes the dumb and careless.

Herrick Vertaplane

(Continued from page 53)

was a notable achievement in itself. Having then the fundamental aerodynamic tools with which to work the next and all important problem was to design an aircraft incorporating the Herrick profile wing to operate as one an airplane, two, as a "windmill" plane, and three convert from one to the other in the air.

Precision Aerobatics

(Continued from page 31)

often upside down no major overhaul has yet been necessary For carburetion when inverted I selected a hand fuel pump from an old wrecked Cadillac and installed this in the cockpit, properly connected to draw fuel from the tank and meter it into the carburetor air intake through a special jet. Before going into inverted flight I fill this pump (if I forget the engine quits running very shortly) then when on my back I maintain carburetion by a steady pressure on the pump handle. There is sufficient fuel in the pump for one minute of flying and after that I must get back into an upright position. A bit crude, perhaps, but it works

Best speeds

By long experience with the Ryan I have learned the ideal speed for every maneuver For example, an outside loop out of inverted position has a normal diameter of 1200 ft and a maximum speed of 280 m.p.h at the bottom of the loop The Ryan can be outside looped within a 700 ft. diameter and at speeds as low as 175 m.p.h., but the maneuver is smoother and there is less strain on the ship when holding to the 1200 ft. diameter and a maximum speed of 240–280 m.p.h A single snap roll works best at 90 m.p.h. and a double snap roll at 118 m.p.h. A vertical snap roll with the Ryan is best if done at a speed of 140 m.p.h. These speeds once established, should never be varied The pilot must learn the "feel" of his controls in order to determine the ideal speed for each maneuver, and he must also learn to watch his airspeed indicator in order to hold that speed consistently. I handle the controls very easily on any airplane, never under any circumstance applying them hard at speeds above 150 m.p.h.

Precision maneuvering is the basis for all aerobatics and every pilot should strive for precision perfection first and more spectacular flying later on It is like a professional typist who must first learn to hit the right keys before he can start practising to be a speed champion But, as I said before, precision maneuvering is not what the crowd likes best, even though it may be more difficult to perform. At the Cleveland National Air Races this year I will stage a show designed entirely as a crowd pleaser. I have worked up a routine that will take about ten minutes. Some of the maneuvers are shown in the accompanying diagrams If you get to Cleveland I hope you'll like it.

Beyond the regular routine there are some specials (see diagram) I've already described the "Oregon Sea Serpent." Then there's the Cuban Roll, introduced by Capt Lem Povey This is a lateral figure eight in either upright or inverted flight, with a half roll at each intersection I have developed a variation of this which I like better—doing the half roll at the ends of the loop instead of the intersection

Another very pretty maneuver, almost harder to describe than to perform, is the Frank Clark Reversement Roll, which is best done by Clark himself who originated it. This consists of two or three vertical rolls, with one or two horizontal rolls at the top near the stall and then a stall and spin down Clark gets a peculiar little twist of his own into this one This is really the pay-off on any aerobatic pilot's success—his ability to take the few basic maneuvers, perform them properly, and still so combine and vary them as to introduce his own individual talents into the show

Aviation's Racing Form

(Continued from page 28)

will be in the same general class with Crosby, Kling and Schoenfeldt Harold Newmann will probably fly his own plane this year, the little four cylinder Menasco powered Folkerts Special, although he may turn the plane over to Roger Dore Rae Marion McKeen will have the Miss Los Angeles groomed to a new high pitch By continued detail cowling and baffling refinements he has been able to take increased power from his C6S engine over long periods and so has pushed the speed of the Miss Los Angeles considerably higher as shown by his time at St. Louis this year While probably not in a class with the newer Menasco powered racers, the McKeen plane is a veteran in the hands of a veteran race pilot and will probably place high in the money

Another new plane in the Greve Trophy race will be the Haines H-3 racer designed, built, and to be flown by Frank J Haines Of low wing cantilever design this plane uses unusual sweepback on the wing and features a transport type windshield Landing gear is retractable The engine is a Menasco B6S formerly used in the Wedell-Williams that Elmendorf flew at Cleveland in 1935 The wing is of wood with a single spar, fuselage of steel tube cloth and metal covered Dave Elmendorf may bring his Elmendorf Special to Cleveland but is not in a class with the competition as the plane did not do well at Los Angeles in 1936 and has not since been worked on.

As there are a number of planes in Thompson Trophy and Greve Trophy competition this year powered with the new Menasco Super Buccaneer, an engine not generally known because not yet available commercially, a description of the engine may be of interest. Of the same displacement as the C6S used by McKeen, the C6S4 550 cu.in engine is a six cylinder supercharged inverted in line power plant with steel barrels bolted to the crankcase, heads screwed and shrunk to the barrels, and with valve gear completely enclosed Twin camshafts are used and the heads and barrels are very generously finned Normal commercial rating is believed to be about 250 h.p. at 2250 r.p.m., but the engine will probably put out in the neighborhood of 400 h.p. at 3,000 r.p.m. for racing purposes This compares very closely with the Renault engine used by Detroyat.

397 cu.in. class

One of the outstanding disappointments of the 1937 program is the failure of new planes to develop in the 397 cu.in class. There have been rumors that this class will be dropped after 1937 but it is to be hoped not. Racing has now advanced to the point where material contributions to the science of cowling, baffling and

study of heat transfer in general are being made by individual experimenters. Such work can be done with the little four cylinder engines as well as with their larger brothers.

The class of the 397 racers this year will again be Harold Neumann's Folkerts Special, Arthur Chester's Chester Special and S. J. Wittman's racer in about that order. All three are well known, and all are on about a par for speed. The Miles and Atwood Special, with which Lee Miles won the National Championship in 1934, will probably be on hand this year and may give the three named above a good run for some of the $10,000 offered in this class. There are three newcomers in this group, of which one or two will probably not arrive at Cleveland. An interesting little racer built by C. C. Flagg and some other men of the Consolidated plant in San Diego, will be flown by Tony LaVier. This plane was described in the August issue of AVIATION. It has been thoroughly tested and should give a good account of itself although powered with a very small engine—the Pobjoy—in anticipation of entering the 290 cu.in. class races abolished this year due to lack of entries at past race meets.

Another possible entry is Wm. Buchanan's Miller powered Zipper which did not get ready in time for 1936. This plane has now been flown and will probably be on hand. A very promising 397 cu.in. entry, if finished in time, is the Chambers racer designed and built by Russel Chambers and to be flown by him. Powered with an unsupercharged Menasco 326 cu.in. B4 Pirate engine, this plane will depend on light weight and clean lines for speed against ships of greater power. The design is very clean, being similar to the Folkerts, with semi high wing of cantilever wood construction, and landing gear that retracts completely into the fuselage. The Chambers landing gear is operated on an entirely different principle than the Folkerts.

Even this far in advance of race time (mid-August) we can predict safely that meet records will be broken in every major event from the 397 cu.in. class to the Thompson and Bendix Trophy races. We expect the new Bendix record to closely approximate, if not beat, Hughes' record time, assuming that the winning pilot will continue to New York for a transcontinental mark. In the Thompson Trophy we expect the mark to go beyond 275 m.p.h. and possibly approach or even exceed 300 m.p.h. In the Greve Trophy Race the winning time should be very close to 275 m.p.h. All of this means that we are learning a great deal about building and flying racing airplanes. Who knows? We may yet win back the Greve and Thompson cups!

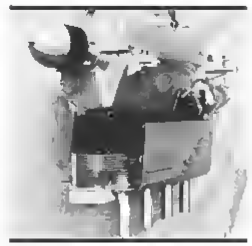
Foreign Builders

(*Continued from page 55*)

Both new planes are supplied with the MG-31 engine of 270 h.p. Main Administration of the Civil Air Fleet intends to utilize both in distance trials. At this writing they are undergoing painstaking tests at the institute, following which the airmen who are to take part in the trials will train in them.

In July the Leningrad institution was completing the construction of a still another sports type, a wooden two seat amphibian, also equipped with the MG-31 engine and intended for distance flights. Its speed is to reach 250 km/h (155 m.p.h.). As soon as it has been built and tested, it will be used as a training ship for a record flight by one of the women pilots of the Civil Air Fleet.

Because of the widespread and unopposed theory in the U.S.S.R. that gliding is the best possible of preparations for piloting powered craft and mastering the latter at a considerably



Cirrus Major Engine

smaller expense as a consequence of such preliminary education, glider designers are always busy in that country. In connection with the all-Union competitions at Dnepropetrovsk in June, the spacious factory of the *Osoaviakhim*, the society with 10,000,000 flying fans among its members has been turning out gliders designed by Engineers Antonoff, Grosheff, Emelyanoff and Sheremetyeff.

Emelyanoff's multi seater *Stakhanovets* has been further improved since last year when it was shown at the Paris Aero Salon to be acknowledged the best of the exhibited gliders. The impressive cruising speed of 105-110 km/h (65.68 m.p.h.) marks the single-seater *Komsomol* originated by Antonoff and Grosheff.

Among the experimental types is the altitude glider RV-1, by Emelyanoff, and Sheremetyeff's "Flying Laboratory." There is no parallel among the contemporary gliders for the RV-1. Its long wings, resembling those of a soaring gull, appear extraordinarily "flimsy."

The "Flying Laboratory" was created for a variety of experiments and meteorological observation during gliding meets. All the latest gliders are provided with comfortable enclosed cabins. One of the most popular older types this year has been the GN-7, designed by Engineer Grosheff and used in 1936 by Master of Soviet Gliding Kimmelmann for setting his distance record of 486 km (302 miles).

Again making a strong bid for popularity in England and elsewhere, the Cirrus Major engine manufactured by Blackburn Aircraft Ltd. has been granted approval by the British Air Ministry for a rating of 150 h.p. A considerably refined version of the original Cirrus engine the new "Major" is of four cylinder unsupercharged type. Normal power is 138 h.p. at 2200 r.p.m., maximum 150 h.p. at 2450 r.p.m. A Claudel-Hobson Downdraft carburetor fitted with a flame trap is mounted directly on the intake manifold. Ignition is supplied by two B.T.H. S.G.4 magnetos. Following conventional English practise the valves are located fore and aft instead of laterally as in American in-line engines. Features include elimination of external oil lines, provision of triple oil pumps and filters, and dual fuel pumps as standard equipment. Weight complete but less generator and starter is 325 lbs.

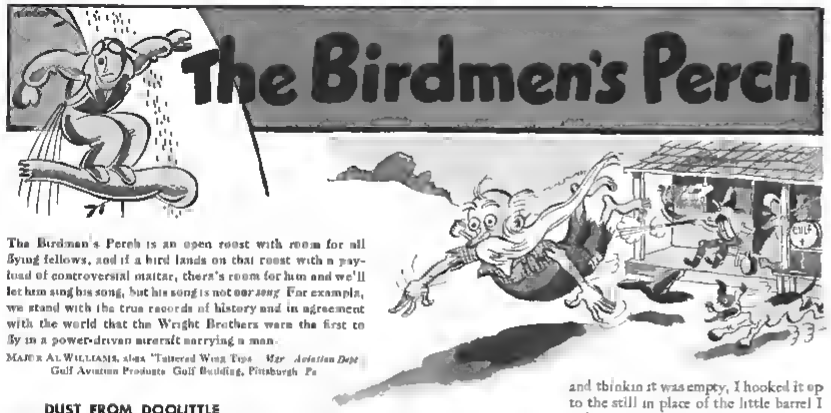
A Correction

An unfortunate error occurred on page 45 of the August issue of AVIATION where it was stated that the Douglas DC-4 was powered with four Wright Cyclone engines. Actually the first DC-4 is being equipped with four Pratt & Whitney Twin Hornet engines rated at 1400 hp. for takeoff (on 95 octane fuel), with normal rating of 1150 hp. at 2350 r.p.m.

Deliveries

for the month ended August 1, 1937

Purchaser and Number of Units	Type of Buyer	Manufacturer and Model	Engine Make and Model
Abrams F. S. E	F.B.	Waco ZKS-7	Jacobs L-5
Air Activities	F.B.	Fairchild G Std	Warner SS
Aircraft Assoc. (7)	Corp.	Taylor J 2	Cont. A-40-4
Aircraft S. & S. (8)	F.B.	Taylor-Young A	Cont. A-40-4
Air Industries	F.B.	Ryan S-T-A	Menasco C 4
Air Service	F.B.	Taylor-Young A	Cont. A-40-4
Airways, Inc. (4)	Corp.	Taylor J 2	Cont. A-40-4
Alex & Byrd	Pvt.	Taylor-Young A	Cont. A-40-4
Ames, L. O	Pvt.	Stearman-Hammond Y 1S	Menasco C 4-S
Anderson, A. M	Pvt.	Stinson SR-8-BD (C)	Lyc. R-680D5
Anniston F. C	F.B.	Taylor-Young A	Cont. A-40-4
Ansett Airways E	Al.	Lockheed 10/B	Wr. Wh.
Aviation Serv	Pvt.	Taylor-Young A	Cont. A-40-4
Barclay W. B	Pvt.	Taylor J 2	Cont. A-40-4
Beardon, E. C	F.B.	Taylor J 2	Cont. A-40-4
Becker Aircraft Sales	Corp.	Taylor J 2	Cont. A-40-4
Bennett Aircraft (3)	F.B.	Waco ZGC-7, ZHS-7, ZPF-7	Jacobs L-5
Bennett A. H	F.B.	Taylor J 2	Cont. A-40-4
Boscook, Kenyon	Pvt.	Stinson SR-8-BD(C)	Lyc. R-680D5
Borth Henning	F.B.	Ryan S-T-A	Menasco C-4
Boulevard Airport	F.B.	Stinson SR-8-B	Lyc. R-680B5
Bowman, K	F.B.	Stearman-Hammond Y-1S	Menasco C4-S
Bowman, Lee	Pvt.	Taylor J 2	Cont. A-40-4
Branson & Cowden	Pvt.	Taylor-Young A	Cont. A-40-4
Brayton Corey	F.B.	Fairchild G DeLuxe	Warner SS
Brayton F. S	Pvt.	Taylor J 2	Cont. A-40-4
Brinckerhoff F. B	F.B.	Taylor-Young A	Cont. A-40-4
Brown Deer F. C	F.B.	Taylor J 2	Cont. A-40-4
Burgess, R. A	Pvt.	Taylor J 2	Cont. A-40-4
Camel City F. B	F.B.	Taylor J 2	Cont. A-40-4
Cannon-Nelson F. S	Pvt.	Waco ZGC-7	Jacobs L-5
Carbone, Joseph	F.B.	Taylor J 2	Cont. A-40-4
Central Air Service	Corp.	Taylor J 2	Cont. A-40-4
Charping, Irby	Pvt.	Stinson SR-8-B (C)	Lyc. R-680D5
Clarke, Calvin P	Pvt.	Taylor-Young A	Cont. A-40-4
Clayton, Delbert H	F.B.	Taylor J 2	Cont. A-40-4
Columbia Airways	F.B.	Beech E17B	Jacobs L-5
Commonwealth Aircraft E	Pvt.	North American NA-16A	P & W R1340-S3H1
Consolidated F. C	F.B.	Taylor J 2	Cont. A-40-4
Cuba H	Govt.	Stinson SR-8-D	Wr. R760-E2
Cub Aircraft, Ltd. E (3)	F.B.	Taylor J 2	Cont. A-40-4
Cub Distributing Co. (3)	F.B.	Taylor J 2	Cont. A-40-4
Cummings, Robert	Pvt.	Cessna C37	Warner S. S.
Daniels, Leonard B	Pvt.	Stearman-Hammond Y-1S	Menasco C4-S
Darby T. J	F.B.	Fairchild G DeLuxe	Warner S. S.
Davis, Robert H	Pvt.	Monocoupe 110	Warner 145
Deborah Motor Car Co	Pvt.	Taylor-Young A	Cont. A-40-4
de Gouveia, A. H. E	F.B.	Taylor J 2	Cont. A-40
DePaoli Aircraft Sales	Corp.	Taylor J 2	Cont. A-40-4
Dewey, H. Bruce	Pvt.	Taylor J 2	Cont. A-40-4
Edgcumbe, Geo. J. (2)	F.B.	Taylor J 2	Cont. A-40-4
Ebe, Elise	Pvt.	Taylor-Young A	Cont. A-40-4
Evans F. B	Pvt.	Howard DGA-8	Jacobs L-5
Eyerly, Lee	F.B.	Fairchild G Std	Warner S. S.
Farrell A. E	Pvt.	Fairchild G DeLuxe	Warner S. S.
Ferris, B. W	Pvt.	Taylor J 2	Cont. A-40-4
Finlayson C	Pvt.	Waco ZGC-7	Jacobs L-5
Fisher, D. J	Pvt.	Taylor J 2	Cont. A-40-4
Fitzgerald J. E	Pvt.	Taylor J 2	Cont. A-40-4
Fleet Aircraft E	F.B.	Waco ZQC-6	Jacobs L-5
Franklin, W. R	Pvt.	Taylor-Young A	Cont. A-40-4
Gannett Publishing	Corp.	Stinson SR-9-FD	P & W TB-440
Garrett, Conover	Pvt.	Taylor J 2	Cont. A-40-4
Gasser, George L	Pvt.	Taylor-Young A	Cont. A-40-4
Gimbel, Bruce A	Pvt.	Beech C17R	P & W
Gmeese Al. T	F.B.	Taylor-Young A	Cont. A-40-4
Goode, R. A	Pvt.	Taylor J 2	Cont. A-40-4
Gordonhill, George	Pvt.	Fairchild H DeLuxe	Ranger 6-390-D3
Green, Prentice S	Pvt.	Taylor-Young A	Cont. A-40-4
Guinea Airways E	Al.	Lockheed Electra	P & W Wasp, Jr
Hanger Co., Inc	F.B.	Stinson SR-8-BD(C)	Lyc. R-680D5
Harris F. S	F.B.	Taylor J 2	Cont. A-40-4
Hatter R. W	Pvt.	Taylor-Young A	Cont. A-40-4
Hoffman, Howard	Pvt.	Taylor J 2	Cont. A-40-4
Howard C. S	Pvt.	Howard DGA-9	Jacobs L-5
Howell, Jr., Paul P	Pvt.	Taylor-Young A	Cont. A-40-4
Hubert & Dillon A. S. (2)	F.B.	Taylor-Young A	Cont. A-40-4
Hundley R. L	F.B.	Taylor-Young A	Cont. A-40-4
Hylan F. S	F.B.	Taylor J 2	Cont. A-40-4
Indiana A. S	F.B.	Taylor-Young A	Cont. A-40-4
Inter City Airlines	F.B.	Fairchild G DeLuxe	Warner S. S.
Johnson & Johnson	Corp.	Stinson SR-9-FD	P & W SB-450
Jones, Jesse, A. S	F.B.	Taylor-Young A	Cont. A-40-4
Jones & Hunnewell (7)	F.B.	Taylor-Young A	Cont. A-40-4
Kepley, James M	Corp.	Beech E17B	Jacobs L-5
Kirbery Ralph	Pvt.	Taylor-Young A	Cont. A-40-4
Koch, Richard W	Pvt.	Taylor J 2	Cont. A-40-4
Kovas & Towers	Pvt.	Taylor-Young A	Cont. A-40-4
Lake County Airways	Corp.	Taylor J 2	Cont. A-40-4
Lamb, Thomas, Jr. E	Corp.	Stinson SR-8-B	Lyc. R-680-B5
Larsen, Roth H	Pvt.	Taylor J 2	Cont. A-40-4
Leonard, A. J	F.B.	Fairchild G Std	Warner S. S.
Lion Oil Refining Co	Corp.	Stinson SR-9-FD	P & W SB-450
Lippiatt, H. C	Pvt.	Waco UKS-7	Cont. W-670
Little Corp	F.B.	Taylor-Young A	Cont. A-40-4
Les Foote F. S	F.B.	Taylor J 2	Cont. A-40-4
Lovejoy Kenneth F	F.B.	Taylor-Young A	Cont. A-40-4
Lucey Products Corp	Pvt.	Spartan 7W-9	P & W S. B. 450
Luft, Herman	Pvt.	Taylor J 2	Cont. A-40-4
Lynes, James D	Pvt.	Taylor J 2	Cont. A-40-4
Machamer J. F	F.B.	Taylor-Young A	Cont. A-40-4
Mattes, Jr., D. H (E)	Pvt.	Stinson Seaplane SR-8-RD	Wr. R760-E2
Maurer H. A	Pvt.	Taylor-Young A	Cont. A-40-4
Menke, Philip A	F.B.	Taylor J 2	Cont. A-40-4
Meyer Hammell, Wolfe & Ports	Pvt.	Taylor J 2	Cont. A-40-4
Miami Aero Corp	Corp.	Taylor J 2	Cont. A-40-5
Mid-City F. S	F.B.	Taylor J 2	Cont. A-40-4
Mitchell & Russell	Pvt.	Taylor-Young	Cont. A-40-4
Molyneux, Russell	Pvt.	Taylor-Young A	Cont. A-40-4
Mousefelder, Oaks	Pvt.	Monocoupe 90A	Lambert R266
Munoz Aviation	Govt.	Waco ZGC-7	Jacobs L-5
Murphy, Bob	Corp.	Beech E17B	Jacobs L-5
Northeast Airways	Corp.	Taylor J 2	Cont. A-40-4
O'Bryan, N. J	Pvt.	Taylor-Young A	Cont. A-40-4
Olden, Henry T	Pvt.	Taylor J 2	Cont. A-40-4
O'Neal Aircraft Co	F.B.	Taylor-Young A	Cont. A-40-4
Ontario Prov. A. S. (E) (3)	Govt.	Stinson Seaplane SR-9-FM	P & W TB-440
Pacific Aircraft Sales	F.B.	Fairchild G STD	Warner S. S.
Packer A. H	F.B.	Taylor-Young A	Cont. A-40-4
Peoples Church	Corp.	Stinson SR-8-RD	Wr. R-760-E2
Peoria Aero Sales	F.B.	Taylor J 2	Cont. A-40-4
Perkins Thos. C	Pvt.	Taylor-Young A	Cont. A-40-4
Phifer, John	F.B.	Taylor J 2	Cont. A-40-4
Phillips, Theodore	Pvt.	Fairchild G DeLuxe	Warner S. S.
Pocahontas F. S	F.B.	Taylor-Young A	Cont. A-40-4
Pocahontas F. S	F.B.	Waco YKS-7	Jacobs L-4
Prichard, H	Pvt.	Taylor J 2	Cont. A-40-4
Purvis, Arthur H. E	Corp.	Stinson SR-9-FD	P & W TB-440
Ranger Engineering	Corp.	Fairchild H DeLuxe	Ranger 6-390-D3
Raymond, Wesley N	Pvt.	Taylor-Young A	Cont. A-40-4
Reasoner E. C	Pvt.	Cessna C37	Warner S. S.
Republic Oil Co	Corp.	Beech D17R	Wr. 450-HP
Rushford, Wm	Pvt.	Monocoupe 90a	Lambert R266
Rosenthal Paul	Pvt.	Beech E17B	Jacobs L-5
St. Louis F. S	F.B.	Fairchild H DeLuxe	Ranger 6-390-D-3
Salzman-Leonard	F.B.	Waco ZGC-7	Jacobs L-5
Salzman-Leonard	F.B.	Taylor-Young A	Cont. A-40-4
Sasse, W. T	Pvt.	Taylor-Young A	Cont. A-40-4
Schuchardt, Al. F	Pvt.	Taylor-Young A	Cont. A-40-4
Schlesselman, Harold	F.B.	Taylor-Young A	Cont. A-40-4
Sharples Specialty	Corp.	Beech D17S	P & W
Sherman Victor F	Pvt.	Monocoupe 90a	Lambert R-266
Simmons, Alton T	Pvt.	Stinson SR-9-FD	P & W TB-440
Southern A. S	F.B.	Stinson SR-8-BD(C)	Lyc. R-680D5
Sound Airways	Corp.	Taylor J 2	Cont. A-40-4
Squires, Floyd H	Pvt.	Taylor J 2	Cont. A-40-4
Southern A. S	Corp.	Taylor J 2	Cont. A-40-4
Southern Michigan Airways	F.B.	Taylor-Young A	Cont. A-40-4
Standard F. S	F.B.	Taylor-Young A	Cont. A-40-4
Staffen, M. F	F.B.	Taylor-Young A	Cont. A-40-4
Stinson Canadian Sales E	F.B.	Stinson SR-8-EM	Wr. R-760-E2
Strong, Horace	Pvt.	Taylor-Young A	Cont. A-40-4
Superior F. C	F.B.	Taylor-Young Model A	Cont. A-40-4
Swaby Ralph	Pvt.	Taylor-Young A	Cont. A-40-4
Sweet, Ralph	Pvt.	Fairchild G DeLuxe	Warner S. S.
Tata Sons E (2)	Al.	Waco YQC-6	Jacobs L-4
Taylor Frank	Pvt.	Taylor-Young A	Cont. A-40-4
The Texas Company N	Corp.	Cessna C37	Warner S. S.
Ulmann, Alex E	Pvt.	Cessna C37	Warner S. S.
Van Dusen, A. O	Pvt.	Taylor J 2	Cont. A-40-4
Veiss John	Pvt.	Beech D17S	P & W
Waco Sales of N. Y. (2)	F.B.	Waco ZGC-7	Jacobs L-5
Waco Sales of N. Y	F.B.	Waco EGC-7	Wr. R-760-E-2
Walker D. B. (2)	Pvt.	Fairchild H DeLuxe	Ranger 6-390-D3
Wallen, G. G	Pvt.	Fairchild H DeLuxe	Ranger 6-390-D3
Warner Aircraft	Corp.	Fairchild G DeLuxe	Warner S. S.
Webster James H	Pvt.	Stearman-Hammond Y-1S	Menasco C4S
Wass, Harley	Pvt.	Taylor-Young A	Cont. A-40-4
Weiner Victor	Pvt.	Taylor-Young A	Cont. A-40-4
Welch, Robert	Pvt.	Monocoupe 90a	Lambert R266
Wellman Dave	Pvt.	Taylor-Young A	Cont. A-40-4
Whitaker A. W	F.B.	Cessna C37	Warner S. S.
Wessels Flying School E	F.B.	Taylor J 2	Cont. A-40-5
Whitaker Art	F.B.	Taylor J 2	Cont. A-40-5
Whitlock, Ernest	Pvt.	Taylor J 2	Cont. A-40-4
Whitney G. J	F.B.	Beech E17B	Jacobs L-5
Wiggins, E. W	F.B.	Beech SE17B	Jacobs L-5
Wiggins Airways (3)	Corp.	Taylor J 2	Cont. A-40-5
Wilke, Carl F	Pvt.	Stinson SR-8-B	Lyc. R-680D5
Wilson, Don	Pvt.	Taylor J 2	Cont. A-40-4
Wings Field Inc	F.B.	Waco YKS-7	Jacobs L-4
Wolta Stadsen	Corp.	Cessna C37	Warner S. S.
Yates, L. A	Pvt.	Fairchild G Std	Warner S. S.



The Birdmen's Perch is an open roost with room for all flying fellows, and if a bird lands on that roost with a payload of controversial matter, there's room for him and we'll let him sing his song, but his song is not our song. For example, we stand with the true records of history and in agreement with the world that the Wright Brothers were the first to fly in a power-driven aircraft carrying a man.

MAJOR AL WILLIAMS, alias "Tattered Wing Type" Mgr. Aviation Dept. Gulf Aviation Products Gulf Building, Pittsburgh Pa.

DUST FROM DOOLITTLE

I was running a survey crew on a job just west of the Cleveland Airport, in a wooded valley. We had just got to the top of the bank, but still in the woods when there was a roar and a hell of a wind, and my hat was gone, and my hair was full of old dried bark that fell from the trees above me.

Well, I got out of that woods in a hurry to see what it was, but could see nothing, so I waited.

"Finally, along comes Major Jimmy Doolittle in No. 11, Granville Brothers Winged Beer Barrel. When he passed over the trees, near where I had been standing, he was so close to them that the wash from his prop was not only tearing off old bark, but actually shredding the green leaves on the tops of the healthy trees. I discovered later that he was tuning up that keg for an assault on the landplane speed record, in which he was successful." —Chas. E. Evers, Jr.

EGG COMES TO BAD END...

You ask whether anyone can give you information as to what happened to Mr. Egg," writes Howard A. Scholle. "As a matter of fact, Durs Egg was a Swiss and not a German, and financed the efforts of his countryman, Samuel John Pauly, in his attempt to construct a dirigible.

It seems that Mr. Egg was gun maker to King George III. And that construction was started on Pauly's "Dolphin," a fish shaped balloon, 85 feet long and 15 feet high, at Knightsbridge in 1816.

The trim of the ship was controlled by a box of sand that could be run from the cockpit to the stern by pulleys. The dolphin-like lines of the main bag were maintained by an inner bag, which was inflated with air, and which replaced the valved gas.

The Dolphin never flew. Pauly died before it was finished. And Durs Egg was left literally holding the bag for the £10,000 he had invested.

However, years later P. T. Barnum, of one-eyed minute fame, inflated the small inner bag of "Egg's Folly," and sent his dwarf, Tom Thumb, up for a successful flight.

There now, we hope that Egg is done to a turn.

THIS MONTH'S WHOPPER

"I sure think your corporation ought to pay for my hound dawg Bess.

I set considerable store by that dawg, Major, and she got hurt bad at the dance last nite, on account of one of your Gulf Aviation gasolene drums. Them flyin machine fellers left it down in the holler, and thinkin it was empty, I hooked it up to the still in place of the little barrel I ordinarily use for refreshments. But when them folks tasted that run last nite, all jerusalem started poppin.

"One nip, and old Ant Josie Bumstead was leap froggin over six of the boys at a swoop. Evan Williams' boy Jabez, that plays the banjo, puts his foot through three inches of solid pine floorin and his banjo goes sailin off playin Joseyphine in My Flyin Machine all by itself.

"Now granpappy's been paralysed since ten years ago he found he couldn't spit over the railin, so I didn't bother none when I seed Harry Zepp give him a swig. But dawggone if granpappy didn't fetch right up ontten that chair, flap his elbows, and whizz right offen the porch so much like a partridge that, fore he knows it, Harry had shot him both barrels and ole Bess was off to retrieve him.

Major, that hound was a mighty fine hunter and she got a sprained back bringin in granpappy. It was sore high power gasolene done it, so I think you ought to pay $10.

"An please send it return male, because we ain't got no money to plant granpappy with." —Lem Gribban's Boy, Georgia

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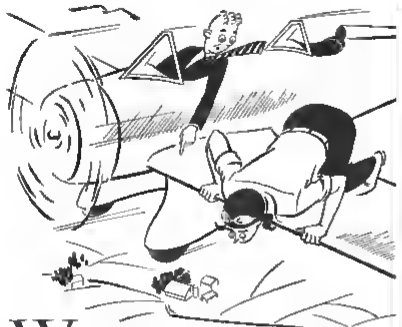

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Dick Merrill (*right*) and co-pilot Lambie—pictured with their RCA Radio Compass equipped plane after transatlantic flight from London to New York.

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OXX6 CURTIS ROBIN for sale. In good shape. Licensed till November. Price $350 cash. Address Clarence Sorenson, Wayne, Nebraska. No. 3

AERONCA C-3. Best possible condition, government licensed, immediate sale desired. $650. Robert Lee, 1528 Maryland Ave., Steubenville, Ohio. No. 4

FAIRCHILD 22, Wright Gypsy, 160 hours, 185 hours since engine major over and excellent condition, good training ship. 1936 Fairchild 24, Ranger, excellent condition, 250 hours, completely equipped for blind flying, engine just major overhauled, two-way radio, landing lights, etc., priced to sell. Custom Cabin Waco Army 225 high compression continental engine, fully energized, big gas tanks, 380 hours flying time, priced low. DePont Airport, Wilmington, Del. No. 5

STINSON SM8A, Lycoming. Semi airwheels, ring, retractable landing lights, heavy landing gear. Total time 680 hours. New upholstery. New battery. Perfect condition. $1450. D. Young, 311 North 34th Avenue, Omaha, Nebraska. No. 6

AMERICAN EAGLE—long nose OX-5. Completely rebuilt and recovered. New upholstery, cockpit doors, windshields, control wires. Motor overhauled, new propeller. Frank Hedley, Jr., Lincoln Park, N. J. No. 7

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WACO—1936 Custom Cabin, 285 Jacobs. Many extras. Priced for immediate sale. The H. C. Robbins Company, Cleveland Airport, Cleveland, Ohio. No. 9

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K R 34 COMET for sale. 185 hp. Bank & Turn, Rate of Climb. Price $1200. K R 21 Kinner 100 hp. less than 350 hours. Gee Bee Model A, OX5, Tassel Air, Scintilla Magneto. Price $400. All ships relicensed and in good condition. New Axelson motor parts for OX, LeBlond, Challenger. Lowest market prices for Eaglerock and Waco. Accessories. Aviation Service Company, Inc., Hartford, Conn. No. 11

MONOCOUPE—145 h.p. Warner Super Scarab, 1934 model, Hamilton Standard Steel Propeller, Electric starter, radio, bank and turn, rate of climb, many other extras. Priced to sell quick. The H. C. Robbins Company, Cleveland Airport, Cleveland, Ohio. No. 12

ENGINES AND PARTS for sale. Liberty 400 h.p.; Hispano E 180 h.p.; also quantities of Pratt & Whitney, Wright, Curtiss and Packard engines. The Vimalert Company, Ltd., 841 Garfield Ave., Jersey City, N. J. No. 13

STINSON TRI MOTOR, Model U. In A-1 condition, equipped with latest type 600-watt public address system of unusual power and range. Exceptional money maker for right party. Present owner has other interests. Will sell at bargain or trade for high grade cabin airplane. F.S. 5e1, Aviation, 330 West 42nd St., New York City. No. 14

STINSON TRI MOTORED T. New 1931. Just relicensed. 3 Lycomings R680, 215 H.P. Wings recovered, propeller etched, A-1 condition. Air wheels, electric starters, flares, landing lights, bonded for radio. Best cash offer or trade. Can finance. Adams, P. O. Box 1172, Hartford, Conn. No. 15

STINSON TRIMOTOR U and T; Pilgrim parts, Hamilton Standard adjustable propellers, Magnetos, Carburetors; Ignition switches; J5 and Waco B cylinders; Air speed indicators, Air temperature gauges, Altimeters, Tachometers. General Airmotive Corporation, Municipal Airport, Cleveland, Ohio. No. 16

AERONCA C-3. Demonstrator. Excellent condition. Purchased new October 1936, 155 total hours, never damaged, brakes, two doors. Bargain, $1050.00. Harry Payne, Municipal Airport, Cleveland. No. 17

"Classified" INDEX

September, 1937

Advertisements in this classification are numbered (end of last line each ad) for indexing

ZENITH Z-6-B 7PCLM "Wasp" C-1. Just recovered, hand rubbed finish, new seats and upholstery. Repair job cost over one thousand. Licensed to June, 1938. (Take-off run with full tanks and 1100 lb pay load only 400 ft.) Best performance plane built with "Wasp" motor. Buying new high speed planes is reason for selling. Price $2,800.00 with approved skis. Write for guaranteed condition and further details. Zimmerly Bros. Air Transport, Lewiston, Idaho. No. 18

PARKS AIR COLLEGE OFFERS—5 place J-5 Lockheed. With or without newly overhauled J-5 engine. Equipment includes Goodrich air wheels, speed ring, rate of climb, electric or hand inertia starter. Licensed to 1938. Red Fuselage, fin and rudder. Dis. cream wings, stabilizer and elevators. A Bargain for quick disposal. Write, wire or phone for further particulars. Parks Air College, Inc., East St. Louis, Ill. No. 19

AIRWHEELS, 16x7x5, with adapters, axles and other sized Goodrich tires and tubes, practically new. Standard steel propeller for J-6-7, less than one hour time since reconditioned at factory. Standard steel propeller for OX5. Type Y150 electric Eclipse starter. Motor overhaul stands. What do you need in Warner and J-6 parts? A quantity has just been received. For the best and fastest service on Continental A-40 engine parts order from us. Snyder Aircraft Co., Municipal Airport, Chicago. No. 20

LOW WING AERONCA, Warner demonstrator, 237 hours total, regular instruments, navigation lights, battery, battery box, and flap. $2250.00. Perfect condition. Aircraft Service, Municipal Airport, Cleveland. No. 21

FOR SALE WINGS. Waco F, Waco 10, J-5, J6-5 Waco Cabin, Aeronca, Travelair, American Eagle. We are equipped to rebuild any wing in 24 hours after it arrives at our factory. N. L. Aircraft Company, Vermilion, Ohio. No. 22

BH-BIRD K-5 Front Exhaust. Plane and Motor completely overhauled. All Yellow, Green stripe, hand rubbed finish, streamline tailwheel, generating lights, Hamilton propeller, Brakes, low pressure tires. Wire or write for guaranteed condition. Price $1,350.00. Zimmerly Bros. Air Transport, Lewiston, Idaho. No. 23

FOR SALE. Waco Custom Cabin built Nov. 1935. Continental engine, Radio, many extras. $2,500.00. State College Air Depot, Inc. No. 24

STINSON TRIMOTOR U and T; Pilgrim parts, Hamilton Standard adjustable propellers, Magnetos, Carburetors; Ignition switches; J5 and Waco B cylinders; Air speed indicators, Air temperature gauges, Altimeters, Tachometers. General Airmotive Corporation, Municipal Airport, Cleveland, Ohio. No. 25

OX5 Mallerized American Eagle cracked. Sell as is or any part. Also one Cub Motor, Mount, one 24 ft. Irving seat pack. Cub new new and used. Mayeco Field, c/o Mr. Lovejoy, Bridgeville, Penna. No. 26

WELCH 2 PCLM—Licensed Continental A-40, 4-Motor, Wheel Control, same as new—Trade for late automobile or open ship. Russell Byer, Willshire, Ohio. No. 27

AERONCA C-3. Licensed July 1938. With new covering, new prop, oleo landing gear, new pylon, motor 200 hours since factory major. Price $575. Otto Rose, 4539 Rising Sun Avenue, Philadelphia, Pa. No. 28

BOEING 40 A three. Pratt & Whitney Hornet A-2 motors. Licensed for twenty night-electric starters, generator, wings newly recovered—fuselage covering excellent—motors recently top overhauled—operating daily and ready for immediate delivery or export. Price $5,000. Jerry Wood, 1258 N. Lombard Ave., Oak Park, Ill. No. 29

FOR SALE WINGS. Waco F, Waco 10, J-5, J6-5 Waco Cabin, Aeronca, Travelair, American Eagle. We are equipped to rebuild any wing in 24 hours after it arrives at our factory. N. L. Aircraft Company, Vermilion, Ohio. No. 30

WACO F—Kinner K-5 side exhaust engine—total time on ship 400, total time on engine 365 hours; 35 hours since major. Just relicensed. Dual controls, semi-airwheels, standard instruments. $1500. Snyder Aircraft Company, Municipal Airport, Chicago. No. 31

J6-9 FORD TRIMOTOR: Only 1200 hours total time, ship and motors in excellent condition, many spare parts included. Price $5,000. Jerry Wood, 1258 N. Lombard, Oak Park, Illinois. No. 32

MODEL K AERONCA, new June 1937, only 97 hours total, brakes, two doors, A-1 condition. Exceptional buy at $1275.00. C. D. Baechli, Municipal Airport, Cleveland. No. 33

WARNER 125 H.P. No. 978. Less than 125 hours since new. No time since major; Heavy duty cylinder heads with Heywood starter connections. CONTINENTAL A-40, No. 1235, less than 70 hours since new. We will take your Continental A-40 cracked or in need of a major in trade. AEROMARINE AR-5, 5 cylinder, 50 H.P. radial air cooled. Snyder Aircraft Company, Municipal Airport, Chicago. No. 34

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FOKKER AMPHIBION. Hornet B 575 HP with only 94 hours since major, ship excellent condition. Bargain $1000.00 down, balance easy monthly payments, trades accepted. Weddell & Smith, Fairchild Distributors, Detroit City Airport, Detroit, Mich. No. 36

KELLETT AUTOGIRO—210 H.P. Continental. Full information on request. $2750 asking price. F.S. 391, Aviation, 330 W. 42nd St., New York City. No. 37

Continued from page 95

FOR SALE

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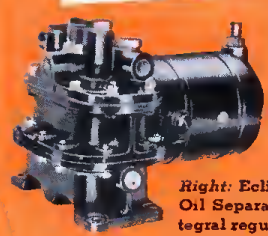
FOR ICE ELIMINATION *Eclipse* MECHANICAL EQUIPMENT

ICE formation on aircraft wing and control surfaces, propeller hubs and windshields during winter and high altitude flying leads to obvious dangers. To eliminate ice formation, Eclipse Aviation Corporation, cooperating closely with the B. F. Goodrich Company of Akron, Ohio (manufacturers of the rubber wing and control surface de-icers) has produced a complete line of mechanical de-icer and anti-icer equipment. With them ice can be conquered.

In addition to the units illustrated, there are available the following: Oil Separators less Relief Valves, Separate Pressure Relief Valves, Check Valves, Suction Regulating Valves, Engine Driven Pumps to provide required suction and air pressure for operation of instruments and De-Icer Equipment. Full information will be sent on request.

ECLIPSE AVIATION CORPORATION
EAST ORANGE, NEW JERSEY
(Subsidiory of Bendix Aviation Corporation)



Left: Eclipse Propeller Anti-Icer Pump (variable output—12 or 24 volt operation) for application of ice removing fluids to propeller hub slingers and windshield.

Right: Eclipse De-Icer Oil Separator with integral regulating valve to control pressure to wing and tail De-Icers.

Left: Eclipse Remote Control Rheostat (shielded) for propeller "Anti-Icer" pump.

Above: Eclipse Electric Motor Driven Ten Port De-Icer Distributing Valve for 12 or 24 volt operation and for operation of wing and tail surfaces Goodrich De-Icers.

Below: Eclipse Electric Motor Driven De-Icer Distributing Valve (less integral control valve) for operation wing and tail surface Goodrich De-Icers.